CMII-100G

CMII Standard for Integrated Process Excellence and Configuration Management

by the
Institute of Configuration Management
and
CMII Research Institute

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About this Standard

How an organization does what it does has everything to do with processes. Every organization has a network of core business processes containing many interdependencies. Some may be clearly defined while others are not. Fragmented or improperly defined processes lead to gaps that result in variability in process output. Where variability occurs, unexpected output also occurs, resulting in the need for process improvement. The degree of needed improvement is revealed by the level of required corrective action.

The need for corrective action does not just happen; it is caused by process issues. When process issues arise, organizations respond by expending intervention resources in their attempt to rescue schedule and quality. To eliminate the need for these corrective action expenditures, the causes of the inefficiencies must be eliminated. To eliminate the causes of the inefficiencies, the variability in the core business processes must be removed.

This standard provides a proven and measurable methodology that enables an organization to improve its core business processes and reduce the need for intervention resource expenditures. It also provides a foundation upon which projects can be successfully managed and conformance quality can be ensured.

The CMII methodology described herein provides the path to integrated process excellence. The appropriate business process infrastructure is shown to be a prerequisite. In addition, its key building blocks are shown to reside in the domain of CM.

This standard therefore serves a dual purpose. It is a standard for achieving integrated process excellence and also a standard for achieving a highly efficient CM process. They are interdependent. It is impossible to achieve one without the other.

NOTE:

This business model has continued to evolve since the 1980s and numerous contributions have been made to ensure the continued efficiency, and best-in-class status, of these practices by CMII graduates and CMII instructors worldwide who are both business process improvement specialists and CM specialists.

Although this standard is copyright protected, organizations that implement this standard may reuse any portion. Where those uses occur, source references to this standard must be provided.

This standard may be used as a mandatory contractual requirement.

CMII-100G CMII Standard
for Integrated Process Excellence
and Configuration Management
(20 pages)

CMII-500D The CMII Model
225 Operating Standards
100 PLM Tool Requirements
19 Forms, Templates and Examples
(65 pages)

CMII Courseware
Four 2-day courses for CMIIB Certification (basics)
+ Two 2-day courses for CMIIC Certification (comprehensive)
+ Two 2-day courses for CMIIA Certification (advanced)
+ One 3-day course for CMIIP Certification (professional)
(1,672 pages)

Continuous Improvement

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ACRONYMS

AP/AR	As-Planned/As-Released
BPI	Business Process Improvement
BPR	Business Process Reengineering
CIB	Change Implementation Board
CRB	Change Review Board
CS-I	Change Specialist I
CM	Configuration Management
DM	Data Management
CMII	Configuration Management Two
DCR	Document Change Record
ECN	Enterprise Change Notice
ECR	Enterprise Change Request
ID	Identification
PR	Problem Report
TRB	Technical Review Board
W/A	Work Authorization

DEFINITIONS

Administrative Requirements — Requirements that define how an enterprise conducts its business, including the strategic business plan, core business processes, operating standards and administrative procedures.

Administrative Procedures — The step-by-step instructions on how to achieve the requirements defined in an enterprise operating standard.

Alternate Item — An item authorized to be used in place of a preferred item on a temporary basis.

Application Requirement (Enterprise) — Requirements (such as government regulations) to which a business must adhere in order to satisfy all legal and regulatory requirements where business is conducted.

Application Requirement (Product) — Requirements that a product must meet in order to satisfy all customer, legal and regulatory demands where the product is produced and also where it is sold and used.

As-Planned/As-Released Baseline — A hierarchy of information which fully defines the current configuration and includes visibility of pending changes.

Baseline — A set of released documents at specific revision levels that define a configuration at a specified point in time.

Business Process Improvement (BPI) — Incremental improvements to one or more of any organization's core business processes.

Business Process Infrastructure — An integrated set of core business processes enabling the ability to accommodate change, keep requirements clear, concise and valid and consistently achieve conforming results.

Business Process Reengineering (BPR) — The radical redesign of core business processes to achieve dramatic improvements in productivity, cycle times and quality.

Change Implementation Board (CIB) — A cross-functional team responsible for creating detailed ECN implementation plans and assigning effectivities for full-track changes.

Change Review Board — A high-level management group responsible for reviewing, dispositioning and prioritizing full-track changes.

Clear, Concise and Valid — Easy to understand. All parties interpret in the same way. If followed as written, the desired results will be achieved.

Closed-Loop Change Process — A core business process used to release new information or change existing released information and in which a change remains "active" until all required actions are completed.

CMII — A business model for an integrated process infrastructure that can accommodate change, keep requirements clear, concise and valid, ensure that work results conform and avoid the need for corrective action.

Configuration Management (CM) — A business process that enables an enterprise to manage what a configuration is supposed to be, including changes, and ensure that configurations, when completed, conform to their documented requirements.

Conformance Quality — A definition of quality based on the principle that quality is "conformance to requirements" instead of a "desirable feature."

Controlling Item or Document — The highest level item or document within a physical item hierarchy that is impacted by a change.

Core Business Process — Any major discipline or activity within an enterprise that is recognized by senior leadership as pivotal to the successful accomplishment of the business objectives and application requirements.

Corrective Action — The extra effort required to compensate for something that should not have happened in the first place. Any time spent in a state of uncertainty about what to do, or how to do it, is also corrective action.

Creator (or Author) — The individual who is responsible for creating and/or maintaining a specific document and who also best understands the higher level requirements that must be achieved by this document.

Design Basis — High-level views of what a configuration is, what it does, how it does what it does and how to produce, operate and maintain it.

Designated User — a representative user of a document who is jointly responsible with its creator for ensuring that it satisfies the needs of all users.

Effective Date — A date entered into the as-planned/as-released baseline that specifies when a superseding document is to be used in place of the superseded document.

Effectivity — A date, lot or serial number which specifies the effectivity for an ECN and which is also the effective date for the controlling item or document impacted by the change.

End-Item — The item that exists at Level 1 in a physical item hierarchy and which also represents the deliverable item.

End-Item Traceability — The ability to trace individual changes at any level within a physical item hierarchy to specific as-built end-items.

Enterprise Change Notice (ECN) — A form used to authorize and control the implementation of approved ECRs. Its item and document impact matrix is used as a roadmap by the CIB to develop a detailed implementation plan.

Enterprise Change Request (ECR) — A form used to request a change or initiate an improvement. It includes estimated cost, benefit and risk information which the CRB uses to make a business decision.

Fast-Track Change — A relatively low risk change wherein the assigned creator and designated user of a document are authorized to approve and implement their own technical recommendation.

Fast-Track Criteria — Criteria established by the CRB and applied by Change Specialist I to determine the proper full-track or fast-track routing.

Flow-Down — The process of driving requirements for subordinate-level items in a hierarchy by the requirements for their parent-level items.

Full-Track Change — A higher risk change wherein the change package is prepared by Change Specialist I (CSI) and dispositioned by the CRB.

Interchangeable — If fully interchangeable, items with the same or different ID numbers may be used interchangeably in all applications.

Interoperabie — The ability of two or more systems to share parts and/or information, including provisions for data exchange.

Intervention Resources — The resources that are spent on corrective action and which should not have been required.

Operating Standard — A detailed requirement to be achieved by a core business process. It defines the "what." Procedures define the "how."

Physical Item Hierarchy — A complete hierarchy of the physical items contained in a product and used as the framework for its baseline.

Primary Document — Documents that represent the requirements for a primary item are primary documents and are linked to the primary item.

Primary Item — Items that reside in the physical item hierarchy for an end-item product.

Problem Report — A form used to report a problem wherein the solution is unknown and which also defines the steps that led up to the problem.

Release — The act of releasing something or putting something into work. A document, for example, cannot be used until it is released.

Secondary Document — A document that defines the requirements for a secondary item. Standardized process documents are also secondary documents.

Secondary Item — Items such as tools used to support primary items and are linked to the primary process document.

Validation — The process of assuring that a documented requirement is clear, concise and valid.

Verification — The process of ensuring that a physical item conforms to its documented requirements. (conformance quality)

I.0 GENERAL REQUIREMENTS

1.1 Scope

1.1.1 A key component of business process improvement is to effectively manage all information that could impact safety, security, quality, schedule, cost, profit, the environment or an organization's reputation. This information is to be documented, placed under formal change control and hereafter referred to as "requirements."

1.1.2 All product-related requirements are managed per this standard.

1.1.3 All facility, equipment and tool related requirements are managed per this standard.

1.1.4 The business enterprise and the hierarchy of administrative requirements used to run the business are managed per this standard.

1.1 5 The ultimate objective is to achieve integrated process excellence. This standard represents an incremental approach to business process improvement (per BPI), not a radical redesign (per BPR).

1.2 Business Process Infrastructure

1.2.1 To facilitate the effective management of the above requirements, a formal business process infrastructure is to be established.

1.2.2 The traditionally recognized activities of configuration management (identification, change control, status accounting and audits) shall be achieved via the business process infrastructure — which is an integration of all CM-related activities as described in Section 1.3.

1.2.3 The business process infrastructure provides the ability to accommodate change and keep requirements clear, concise and valid. It enables project management and quality assurance to perform their activities reliably and efficiently.

1.2.4 As-planned/as-released baselines, closely coupled with a closed-loop change process with fast-track capability, are the backbone of the business process infrastructure.

1.2.5 Standardized naming and numbering conventions are used to identify all physical items and their documented requirements.

1.2.6 The development process is designed to populate baselines with the appropriate hierarchy of items and documented requirements.

1.2.7 Traceability of requirements and work accomplished is accomplished through records.

1.2.8 The integrity of documentation, records and data are a high priority.

1.2.9 One common closed-loop change process is used to release new requirements and to change requirements already released.

1.2.10 The required functionality for an organization's information systems and business tools is driven by the above infrastructure.

1.2.11 To accommodate change, all requirements are to be properly identified, structured, linked and owned.

1.2.12 The lowest common denominators for managing information are physical items, documents, forms, records and associated data.

1.3 CM-Related Activities

1.3.1 All CM-related activities, as identified below, are integrated into one cohesive unit and formally recognized as core business processes.

1.3.2 Configuration management — serves to ensure that configurations conform to their documented requirements.

1.3.3 Requirements management — serves to ensure that documented requirements are clear, concise and valid.

1.3.4 Change management — a closed-loop process for changing released documents and data.

1.3.5 Release management — ensures that documents are authorized and released prior to use.

1.3.6 Data management — ensures that data bases are accurate, deliverable data is secure and that data can support interoperability.

1.3.7 Records management — retains traceability of all work with proof of conforming results.

1.3.8 Document and library control — protects knowledge assets and prevents unauthorized changes.

1.3.9 Enabling software tools — serve to enhance overall process reliability and efficiency.

2.0 DETAILED REQUIREMENTS

2.1 Business Process Infrastructure

This infrastructure is designed to achieve; as-planned/as-released baseline requirements, development process requirements, naming, numbering and reuse requirements, data and record integrity requirements, validation and release record requirements, changes and revision record requirements, as-built record requirements and enabling information system requirements.

2.1.1 As-planned/as-released baseline requirements

2.1.1.1 An as-planned/as-released baseline is used to maintain configuration definition which may include physical items, documented requirements and associated changes.

2.1.1.2 The requirements extend vertically from the application requirements for an end-item, or business regulations for an enterprise, to the lowest level physical items and documents in each case.

2.1.1.3 Each item residing at each level in a physical item hierarchy has its own unique set of documented requirements.

2.1.1.4 Physical items are identified by identification number, name and description and may include lot numbers and serial numbers.

2.1.1.5 Documents are identified by type, number and revision level.

2.1.1.6 Changes are displayed in terms of superseded and superseding items and documents and the transition is controlled by the effective dates for each document.

2.1.1.7 Each like-family of end-item products has its own as-planned/as-released baseline which is identified by a model number.

2.1.1.8 Each in-service product has its own set of as-built/as-maintained records and is identified by its model and serial number.

2.1.1.9 Each facility of an enterprise has its own as-planned/as-released baseline which carries a corresponding identity.

2.1.1.10 A baseline is used to manage the configuration of the enterprise except the physical item hierarchy is replaced with an administrative hierarchy. (There are no physical items).

2.1.2 Development process requirements

2.1.2.1 Development is a 4-tier, 9-step process.

2.1.2.2 Steps 1 and 2 are in the 1st tier. Step 1 serves to define the application requirements and step 2 creates the design basis.

2.1.2.3 Steps 3, 4 and 5 are in the 2nd tier. Step 3 extends the design basis into a physical item hierarchy. Step 4 identifies secondary items, documents and owners. Step 5 identifies required document release dates.

2.1.2.4 Steps 6 and 7 are in the 3rd tier. Detailed designs and processes are created, validated and released in step 6. Prototypes, if needed to further validate the documents, are built in step 7.

2.1.2.5 Step 8 is in the 4th tier. Initial end-item products are built in step 8. Development is concluded once the documentation needed to support all lifecycle phases is created, validated and released.

2.1.2.6 Step 9 is not really a step. Step 9 is used to collect all costs spent on corrective action in steps 1 through 8.

2.1.2.7 Steps 1 and 2 should consume less than 6% of the total development effort and lock-in over 90% of the total lifecycle costs.

2.1.2.8 If the first 8 steps are taken in proper sequence and brought to proper closure, corrective action costs should not exceed 10% of the total development effort.

2.1.2.9 The primary product of development is documentation that is clear, concise and valid.

2.1.3 Naming, numbering and reuse requirements

2.1.3.1 Standardized naming and numbering conventions shall be assigned to all physical items and documents.

2.1.3.2 All physical items, including purchased items that may have the supplier's ID number, are assigned an internal ID number.

2.1.3.3 Numbering conventions are preferably numeric, nonsignificant and may include dash-number extensions.

2.1.3.4 Each physical item is named with a generic noun and described by listing its attributes in descending order of significance.

2.1.3.5 The entire population of physical items can be reviewed by name and description to reveal their potential for reuse.

2.1.3.6 Items that have different ID numbers and which are fully interchangeable are cross-referenced in an equivalent item record.

2.1.3.7 An item that may be used in place of a preferred item on a temporary basis is cross-referenced in an alternate item record.

2.1.3.8 Revision levels are assigned to documents, not physical items.

2.1.4 Data and record integrity requirements

2.1.4.1 Any data used by any core business process within any phase of the product lifecycle is validated and formally controlled.

2.1.4.2 Each data element is co-owned by a creator and a designated user.

2.1.4.3 Data entry techniques are designed to ensure that specific data can be entered efficiently and correctly.

2.1.4.4 Data is secured and protected in accordance with its level of importance.

2.1.4.5 A transaction history record is retained for all data entry transactions for a predetermined period of time.

2.1.5 Validation and release record requirements

2.1.5.1 Any document that could impact safety, security, quality, schedule, cost, profit, the environment or an organization's reputation is validated and controlled.

2.1.5.2 Simple documents are co-owned by a creator and a user. Complex documents are co-owned by a creator and a user team.

2.1.5.3 Each controlled document must be validated before it can be released and released before it can be used.

2.1.5.4 Place-holders are used to enter planned documents into the as-planned/as-released baseline.

2.1.5.5 A release record is retained for each document that has been validated and released.

2.1.6 Changes and revision record requirements

2.1.6.1 A closed-loop change process is used to release new information and to change information already released.

2.1.6.2 Standardized forms are used as templates to guide new releases and changes through the required steps.

2.1.6.3 A problem report form is used to report a problem, where it occurred and the steps which led to its occurrence.

2.1.6.4 An ECR form is used to request changes and initiate reviews that will result in a proper disposition.

2.1.6.5 An ECN form is used to implement approved ECRs and provide the authority to upgrade and release associated documents.

2.1.6.6 Document change record (DCR) forms are used to record the differences between superseded and superseding documents.

2.1.6.7 A problem report log is used to assign control numbers and track the completion status of problem reports.

2.1.6.8 An ECR log is used to assign control numbers and track the completion status of ECRs.

2.1.6.9 The detailed implementation plan for each complex ECN is derived from a master list of standardized tasks.

2.1.6.10 An ECN is closed once its effectivity and other specified requirements have successfully been achieved.

2.1.6.11 Required change records include completed problem reports, ECRs, ECNs and DCRs.

2.1.7 Verification and as-built record requirements

2.1.7.1 Each physical item in the supply chain has an as-built record which includes evidence that it conforms to its requirements.

2.1.7.2 Specific guidelines identify the required level of security and retention periods for each type of as-built record.

2.1.7.3 As-built records may be retrieved by item ID number and serial number and/or by work authorization number.

2.1.8 Information system requirements

2.1.8.1 Information systems are used to enable business processes by bringing documentation, records and data on-line, by automating work flows, and by automatically populating the data fields in baselines, forms and metadata templates.

2.1.8.2 Enabling software tools must support the business process infrastructure as described in core business process categories 2.1.1, 2,1,2, 2.1.3, 2.1.4, 2.1.5, 2.1.6 and 2.1.7.

2.1.8.3 Enabling tools must be interfaced in a manner in which individual data elements can be entered once and reused throughout the system without requiring reentry.

2.1.8.4 Enabling software tools must continue to function in the event that primary systems and/or primary data bases are lost, disabled or compromised.

2.2 Other Enterprise Core Business Processes

The other core business processes include, but are not limited to:

- Business program management;
- Research and development engineering;
- Marketing, sales and contracts;
- Supply chain management;
- Order fulfillment and as-built records;
- Quality assurance
- Operation, maintenance and logistics;
- Human resources and training;
- Financial accounting and reporting;
- Regulatory compliance and governance;
- Export controls and security; and
- Process oversight and internal audit.

All parties communicate via the business process infrastructure.

3.0 CONFORMANCE MEASUREMENT CHECKLISTS

3.1 Usage of These Checklists

This standard may be used as a compliance document. The following checklists are provided solely for measuring compliance.

NOTE: These checklists are not intended as a replacement or substitute for formal CMII training, and do not assure a comprehensive understanding of the CMII model or CMII principles.

3.2 Checklist for Defining the Destination

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1. **Core business processes have been identified and a cross-functional team established whose members can adequately represent each of those core processes** . . . . . ☐
2. **CM is identified as a core business process** . . . . . ☐
3. **Team members are respected and fully supported by the top executive within their represented activities** . . . . . ☐
4. **All team members are expected to participate in this effort through no less than step 5 of the 8 implementation steps** . . . . ☐
5. **A steering committee is established with members comprised of the highest levels of management** . . . . . ☐
6. **Implementation team and steering committee members have been properly trained with regard to the objectives** . . . . . ☐
7. **The CMII destination is documented in the form of a revised strategic business plan** . . . . . ☐
8. **The requirements to be achieved by each core business process are consolidated into one set of operating standards** . . . ☐
9. **The enterprise operating standards were validated by the core process owners and approved by the steering committee** . . . ☐
10. **Plans for assessing existing practices and tools relative to the approved destination were approved by the steering committee** . ☐

3.3 Checklist for Creating a Detailed Transition Plan

1. An assessment of existing practices and enabling tools relative to the desired destination was completed . . . . . ☐
2. Action items required to transition from existing practices to the preferred practices were identified . . . . . ☐
3. The transition plan represents an incremental approach. Each set of operating standards will be validated in a pilot phase . . . . . ☐
4. The core CM process owner is the creator of the transition plan for the business process infrastructure . . . . . ☐
5. The transition plan for the business process infrastructure was validated by the owners of the other core business processes . ☐
6. The other core business process owners have created the transition plan for their respective interfaces . . . . . ☐
7. The transition plan for the interface with each core business process is to be validated by a designated user . . . . . ☐
8. Performance measurements have been identified and will be used to monitor progress and return on investment . . . . . ☐
9. Resources needed to support the overall transition plan have been identified and quantified . . . . . ☐
10. The overall transition plan has been reviewed and approved by the steering committee . . . . . ☐

3.4 Checklist for Confirming Achievement of the Destination

1. The CMII methodology is being used to manage all internal business programs that have a long term future . . . . . ☐
2. The interfaces with suppliers have been refined as needed to achieve compatibility with the CMII methodology . . . . . ☐
3. The organization excels at accommodating change and keeping requirements clear, concise and valid . . . . . ☐
4. The need for deviations, waivers or variances has continued to decline and are now rarely used . . . . . ☐
5. The resources being spent on corrective action have continued to decline and are now less than 10% . . . . . ☐
6. Real improvements have become increasingly robust as the resources spent on intervention have declined . . . . . ☐
7. Quality of life has continued to improve and the organization is now rated as one of the best places to work . . . . . ☐