

CMII-Compliant Software Tools

**Specific Process Requirements
and
Required Tool Functionality**

**5-Star Rating System
for Enabling Software Tools**



CMII Business Model and Enabling Software Tools

THE CMII BUSINESS MODEL

CMII is a business model for achieving integrated process excellence. It provides an infrastructure which enables organizations to accommodate change and keep requirements clear, concise and valid. Without this capability, an organization has no choice but to operate in the corrective action mode and spend a huge ratio of their resources on intervention.

As-planned/as-released baselines coupled with a closed-loop change process are the cornerstone of the CMII model. In ITIL terms, CMII baselines are a best-in-class version of a Configuration Management Data Base (CMDB). All resources are requirements-driven through the baselines — which are always current and include visibility of planned changes.

CMII is also a model for how work is done. All work is authorized and controlled with forms. All work is performed by creator and user teams who excel at achieving consistent conformance and continuous improvement.

ABOUT ENABLING SOFTWARE TOOLS

For a business enterprise, significant benefits can often be achieved by simply changing how information is managed and how work is done — regardless of the capabilities of existing software tools. To fully achieve the potential benefits, however, tools with the appropriate functionality are essential.

To fully understand what the software tools need to do, it is necessary to fully understand what the process to be enabled is to accomplish.

This document identifies specific process requirements (or operating standards) in each of 17 process areas (or core business processes). The specific requirements represent a blend of process and tool capabilities. Those that are tool oriented are underlined. Those that are mandatory for achieving CMII certification (the first star) are coded with an M.

		Seventeen Core Business Processes (Process Areas)	Total Req'mts	Tool Req'mts	Mandatory Req'mts
Process Infrastructure	1.0	As-Planned and As-Released Baselines	30	29	26
	2.0	4-Tier, 9-Step Development Process	9	4	2
	3.0	Naming, Numbering and Reuse	12	11	3
	4.0	Validation and Release Records	8	7	2
	5.0	Changes and Revision Records	12	12	7
	6.0	Information Systems	10	9	4
	7.0	Facilities	7	7	0
	8.0	Security, Safety and Environmental	3	2	0
	9.0	Business Program Management	3	2	0
	10.0	Research and Development Engineering	5	4	0
	11.0	Marketing, Sales and Contracts	3	2	0
	12.0	Supply Chain Management	5	5	0
	13.0	Order Fulfillment and As-Built Records	3	2	0
	14.0	Support, Operation and Maintenance	4	4	0
	15.0	Human Resources and Training	3	3	0
	16.0	Financial Accounting and Reporting	4	1	0
	17.0	Process Oversight and Internal Audit	3	0	0
		TOTALS:	124	104	44

5-Star Rating Scale for CMII-Compliant Tools						
1	2	3	4	5	Previous Criteria	New Criteria
*					Tool provides the mandatory elements of functionality required for CMII certification..	Tool provides the 44 mandatory elements of functionality required for CMII certification..
	*				Developer has continued to improve overall CMII functionality since initial certification.	Tool provides at least 15 of the 60 additional elements of desired functionality.
		*			Feedback from CMII grads using and/or evaluating the tool is highly positive.	Tool provides at least 30 of the 60 additional elements of desired functionality.
			*		The as-certified tool is used internally to manage its baseline and ongoing changes.	Tool provides at least 45 of the 60 additional elements of desired functionality.
				*	Tool provides robust functionality across the full spectrum of CMII requirements.	Tool provides all 60 of the additional 60 elements of desired functionality.

TOOL-ENABLED PROCESS REQUIREMENTS FOR EACH KEY PROCESS AREA

1.0 AS-PLANNED/AS-RELEASED BASELINES

A baseline is an index to a repository of information about a specific product or a like-family of products, a facility, a system, a business enterprise or another type of entity. A baseline includes the identity of each member of that entity along with their relationships and key attributes. A baseline represents how the information is organized. It also shows how the information has changed and includes visibility of pending changes.

BASELINES FOR END-ITEM PRODUCTS

- 1.01 Each like-family of end-item products has its own as-planned/as-released baseline
M which, in most cases, is identified by a model number.
- 1.02 Physical item hierarchies are used as the framework for organizing and managing the information contained in product baselines.
- 1.03 Physical item hierarchies are defined by bills of material — which are treated as
M documents and identified by type, number and revision level.
- 1.04 Each item residing at each level in a physical item hierarchy has its own unique
M set of documented design and process requirements.
- 1.05 Baseline format: the physical item hierarchy is on the left, documented requirements for each item are in the middle and planned changes are on the right.
- 1.06 Baseline fields for items and documents: Physical items are identified by ID
M number and name. Documents are identified by type, number and rev level.
- 1.07 End-item application requirements reside at the highest level of the hierarchy.
M Components and raw materials reside at the lowest levels.
- 1.08 Place holders may be inserted into the physical item hierarchy to reserve a place
M for items yet to be designed and documents yet to be released.

- 1.09 **Physical items contained in the hierarchy of an end-item are primary items. Documents linked to primary items are primary documents.**
- 1.10 **Tools used to support primary items are secondary items which are linked to primary process documents (and identified by ID number and name).**
M
- 1.11 **Standardized processes are secondary documents which are linked to primary process documents (and linked by type and number only, not revision level).**
M
- 1.12 **Through linkages, it possible to click on any item and see its content.**
M
- 1.13 **It is possible to click on any item or document and see where it is used.**
M
- 1.14 **Clicking on the ID number of a physical item results in an option to see the item itself or an option to see its metadata.**
M
- 1.15 **Metadata for each physical item includes its documented requirements, source and cost information, item type, handling codes, control codes and so on.**
M
- 1.16 **Clicking on the type, number and rev of a document results in an option to see the document itself or an option to see its metadata.**
M
- 1.17 **Metadata for each document includes its CAGE code, assigned creator, designated user/(s), format, repository and so on.**
M
- 1.18 **Planning bills used to drive scheduling systems such are ERP are derived from the as-planned/as-released baseline.**
M
- 1.19 **The baseline contains "percent usage" information used to drive business forecasts for customer orders which include customer-selected options.**

BASELINE CHANGES

- 1.20 **Baseline changes are displayed in terms of superseded and superseding items and documents along with the associated ECN authority and effectivity.**
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- 1.21 **Each document has an effective date (which may or may not be the same as its release date).**
M
- 1.22 **The ECN effectivity is also the effective date for the controlling document (highest level item and/or document in the hierarchy impacted by the change).**
M

- 1.23 Clicking on the ECN number results in an option to see the ECN or an option to
M see its detailed implementation plan.
- 1.24 All information contained in an as-planned/as-released baseline is derived from
M the ECN impact matrix and the detailed ECN implementation plan.
- 1.25 Each new document has a planned release date which is replaced with an actual
M release date. Shading is one option for distinguishing between the two.
- 1.26 Superseded items and documents are moved from the as-planned/as-released
M baseline to a historical record once a change effectivity has been achieved.

BASELINES FOR FACILITIES, SYSTEMS AND THE ENTERPRISE

- 1.27 A baseline is also used to manage the business enterprise except the physical item
M hierarchy is replaced with a hierarchy of administrative requirements.
- 1.28 Enterprise requirements extend from business regulations and a strategic business
M plan at the top levels, to operating standards and procedures at the lower levels.
- 1.29 Each facility has its own as-planned/as-released baseline which carries the iden-
tity of the facility.
- 1.30 Each information system has its own as-planned/as-released baseline which car-
ries the identity of the system.

2.0 4-TIER, 9-STEP DEVELOPMENT PROCESS

The development process is represented by a V-model. Designs and processes are developed top-down in the left leg and configurations are produced bottom-up in the right leg. Steps 1 and 2, in the first tier, create the high-level plan. Steps 3, 4 and 5, in the second tier, extend the high-level plan into a detailed plan. Steps 6 and 7, in the third tier, create detailed designs and processes. Step 8, in the fourth tier, builds the end-item product. Step 9, also in the fourth tier, collects all corrective action costs expended in the first 8 steps.

- 2.01 Work packages for developing an end-item product are derived from its physical
M item hierarchy and the documented requirements for each item at each level.

- 2.02 The work breakdown structure for development is created and maintained within M the as-planned/as-released baseline.**
- 2.03 Assigned creators and designated users of each document within a work package are responsible for achieving their work package on time and within budget.**
- 2.04 Step 1 of the 9-step development process serves to define the application requirements and step 2 serves to develop the design basis.**
- 2.05 Step 3 extends the design basis into a hierarchy of primary items and documents. Step 4 identifies secondary items and documents. Step 5 identifies release dates.**
- 2.06 Detailed designs and processes are created, validated and released in step 6. Any prototypes needed to further validate released documents are built in step 7.**
- 2.07 The first end-item product is built in step 8. Development is concluded once the design and process definition is suitable for other life cycle phases.**
- 2.08 Step 9 is used to collect corrective action costs that result from any excessive spiraling that occurs during the first 8 steps.**
- 2.09 All development resources work to one set of priorities — which is the planned release dates for primary documents as specified in the baseline.**

3.0 NAMING, NUMBERING AND REUSE

Physical items and documents are identified through standardized naming and numbering conventions. ID numbers are used to control interchangeability. Naming conventions provide visibility of the potential for reuse.

- 3.01 Each physical item is assigned a generic noun as its name. Proper names are derived from controlled lists of nouns and aliases.**
- 3.02 Each physical item is described by listing its attributes in their descending order of significance.**
- 3.03 Descriptions are derived from a hierarchy of standardized attributes. Once a selection is made, the system provides prompts for the next selection.**
- 3.04 The entire population of physical items can be reviewed by name and description to reveal similarities, differences, possible redundancies and potential for reuse.**

- 3.05 All primary items are assigned an internal identification number, including purchased items which may also carry the supplier's ID number.**
M
- 3.06 Physical items with the same ID number are, by definition, fully interchangeable. Items that are not fully interchangeable cannot carry the same ID number.**
- 3.07 Interchangeable items with different ID numbers are cross-referenced in an "equivalent item" record.**
M
- 3.08 A physical item that may be used temporarily in place of a preferred item is cross-referenced to the preferred item in an "alternate item" record.**
- 3.09 Serial numbers may be used to distinguish between physical items that have the same ID number.**
- 3.10 To support 2-way traceability, a physical item can be traced back to its source lot and all members of that lot can be traced forward to their current locations.**
- 3.11 Documents are identified by type, number and revision level. The document type may be reduced to a 2-digit code.**
M
- 3.12 Physical items of the same type require the same types of supporting documents.**

4.0 VALIDATION AND RELEASE RECORDS

Each document and each data set is validated by one or more users who help ensure that the highest level of integrity is achieved. Evidence of their validation is retained in the document release records.

- 4.01 Each relatively simple document is co-owned by a creator and a designated user.**
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- 4.02 Each complex document is owned by a creator and a cross-functional team of users.**
M
- 4.03 A document must be validated by its assigned creator and designated user/(s) before it can be released. It must be released before it can be used.**
- 4.04 The document owners sign the actual document upon its initial release. They sign the Document Change Record (DCR) each time it is revised thereafter.**

- 4.05 Data bases are audited periodically to determine their accuracy and effectiveness of error prevention techniques. The goal for accuracy is 100%.
- 4.06 Each data element is secured and data entry is controlled by password.
- 4.07 Each data element is co-owned and validated by an assigned creator and a designated user.
- 4.08 A transaction record is retained for all data transactions for a predetermined period of time.

5.0 CHANGES AND REVISION RECORDS

A closed-loop and self-correcting change process with fast-track capability is used to update all baselines and associated repositories of information. Full traceability is retained through change and document revision records.

- 5.01 A closed-loop and self-correcting process is used to release new information and **M** to change information already released.
- 5.02 Standardized forms are used as templates to guide new releases and changes **M** through the required steps of the closed-loop change process.
- 5.03 A standard problem report form is used to report problems, describe the associated environment and the sequence of steps which led to its occurrence. **M**
- 5.04 A standardized ECR form is used to request changes and initiate the appropriate **M** reviews and recommendations that will result in a prompt and proper disposition.
- 5.05 A standardized ECN form is used to implement approved ECRs and provide the **M** authority to upgrade and release associated documents.
- 5.06 The ECR form may also used as the ECN form for low-risk changes that can be **M** implemented on a fast-track basis.
- 5.07 DCR forms are used to capture the differences between superseded and superseding documents and provide "was-is" records for traceability purposes.

- 5.08 Each problem report is validated for clarity and, if accepted, logged, assigned a number, prioritized, routed for appropriate action and tracked to completion.
- 5.09 Each ECR is validated for clarity and, if accepted, logged, assigned a number, prioritized, routed for appropriate action and tracked to completion.
- 5.10 The ECN includes impact matrices of all superseded and superseding items and **M** documents which are used by the CIB as an implementation roadmap.
- 5.11 Implementation plans for fast-track changes can be specified on the ECR/ECN form by the creator who provided (and approved) the technical recommendation.
- 5.12 Detailed implementation plans for complex ECNs are derived from a master list of standardized tasks and displayed in a critical path format.

6.0 INFORMATION SYSTEMS

Information systems are used to bring information on-line and automate work flows. Information can be organized, displayed and/or utilized in a manner that is most advantageous to each user.

- 6.01 Required functionality for enabling software tools is driven by the business pro-
M cess infrastructure and core business processes.
- 6.02 Administrative procedures and enabling tools provide the how-to for achieving the enterprise operating standards.
- 6.03 Enabling software tools provide the functionality needed to create and maintain
M as-planned/as-released baselines.
- 6.04 Enabling software tools provide the functionality needed by Change Specialists
M I, II and III to manage the closed-loop and fast-track change process.
- 6.05 Enabling software tools provide the functionality needed by the CIB to prepare detailed ECN implementation plans in a critical path format.
- 6.06 CIB members are able to access the master schedule, on-hand inventory and work-in process records as needed to assign change effectivities.

- 6.07 Enabling software tools provide the functionality needed by Change Specialist II to track actual versus planned completions of implementation tasks.
- 6.08 Enabling software tools provide the functionality needed to balance work loads against capacity, and ensure that tasks are worked in proper sequence.
- 6.09 Enabling software tools provide functionality needed to ensure that information **M** repositories are secure and access is limited to authorized personnel.
- 6.10 Enabling software tools must continue to function in the event that primary systems and/or primary data bases are lost, disabled or compromised.

7.0 FACILITIES AND ASSET MANAGEMENT

An organization's facilities, processes and intellectual property represent important assets that must be properly protected and maintained. Relationships between various elements are identified through linkages.

- 7.01 An as-planned/as-released baseline for a facility represents its as-built configuration and includes visibility of planned changes and their effectivities.
- 7.02 Appropriate operation and maintenance instructions are linked to each system, assembly and/or component along with its design requirements.
- 7.03 The operational status of each facility, each closed-loop system, each repairable item and each replaceable item is routinely updated and known at all times.
- 7.04 An inventory of all assets within each facility is kept current and the status of each asset is known at all times.
- 7.05 Maintenance requirements are identified and scheduled as standardized tasks and the resources required to accomplish each task are planned accordingly.
- 7.06 Unplanned maintenance activities are recorded and planned activities are upgraded as appropriate to reduce the resources spent on unplanned activities.
- 7.07 Baselines and as-built records are updated with each modification. The superseded configuration is retained in history and may be retrieved at any time.

8.0 SECURITY, SAFETY AND ENVIRONMENTAL

In simple terms, security pertains to preventing unauthorized activity. Safety pertains to preventing accidents. To protect the environment is to prevent it from being harmed on purpose or by accident. Considerations for security, safety and the environment are similar in that government-imposed regulations were necessary before appropriate action could be assured of being taken. On the other hand, these issues are closely correlated with quality, schedule and cost. Any improvement to one will improve the others.

8.01 In the interest of security, all assets are categorized and/or classified and protected in accordance with their level of importance.

8.02 In the interest of safety, all areas that are prone to accidents are identified and preventive measures are taken to minimize such occurrences.

8.03 There are similar provisions for protecting the environment. Any breaches are investigated and root causes are identified and eliminated.

9.0 BUSINESS PROGRAM MANAGEMENT

Business programs include all externally funded contracts and all internally funded projects. The manager of each business program is responsible for coordinating the development of the program plan and achieving the program objectives on-time and within budget. The business program objectives are achieved through the core business processes.

9.01 For new products, the program manager works with a cross-functional team to define the application requirements and develop the design basis.

9.02 All work on a business program is accomplished via the core business processes, which includes monitoring cost and schedule performance.

9.03 The business program manager is responsible for reporting cost and schedule performance to upper management.

10.0 RESEARCH AND DEVELOPMENT ENGINEERING

The primary roles of research and development revolve around developing better engineering standards and ensuring those standards are properly utilized. The cross-functional development team is led by research and development engineering when not led by program management.

10.01 The role of research is to introduce better materials and processes. Development utilizes the better materials and processes to improve products and services.

10.02 Research and development are jointly responsible for creating and maintaining standard part catalogs to be used across all business programs.

10.03 They are jointly responsible for creating and maintaining design and process standards to be used throughout the enterprise.

10.04 They are jointly responsible for ensuring that products being produced are compatible with the standards where the products are being used.

10.05 They are jointly responsible for creating and maintaining standards for packaging, labeling, preservation, handling, storage and disposal.

11.0 MARKETING, SALES AND CONTRACTS

Marketing strives to generate interest in the organization's products and services and Sales strives to make the sale. Sales, in many cases, are consummated in the form of a contract.

11.01 Marketing strives to build interest in the brand or in something that potential customers can correlate with the organization.

11.02 Sales strives to leverage the marketing, design features, product attributes and cost data to achieve sales goals.

11.03 Communications between Sales and other activities are achieved via the business process infrastructure, which includes translations from as-sold to as-built units.

12.0 SUPPLY CHAIN MANAGEMENT

Bills of material must be structured to support the supply chain in each life cycle phase. Planning bills are used in conjunction with the master schedule to drive procurement. Planning bills are converted to order bills as forecasts transition into customer orders. Planning bills include changes and effectivities. A master schedule change may require effectivities to be reassigned.

12.01 Planning bills are derived from as-planned/as-released baselines and used to drive material scheduling systems such as ERP.

12.02 Planning bills include any superseded and superseding items that are to be changed along with the CIB-assigned effectivity.

12.03 Planning bills, in a build-to-order environment, include customer-selected options and planned usage rates.

12.04 An order configurator is used in a build-to-order environment to ensure that the selected options are complete and compatible.

12.05 CIB members use the master schedule along with on-hand and on-order information to determine the appropriate effectivity for each change.

13.0 ORDER FULFILLMENT AND AS-BUILT RECORDS

There is a work authorization for each MAKE and each BUY order. The work authorization references the documented requirements for that order. Completed work authorizations are retained as as-built records.

13.01 All work performed on physical items, in which the results must conform to documented requirements, must be accomplished with a work authorization.

13.02 Retained work authorizations include positive evidence that the finished items conformed to their documented requirements.

13.03 Completed work authorization records include assigned lot and serial numbers when applicable.

14.0 SUPPORT, OPERATION AND MAINTENANCE

In-service equipment is categorized by type and identified by model or ID number and serial number. There is an up-to-date inventory of all items being operated and maintained. Each item in the physical item hierarchy of each end-item is linked to its operation and maintenance instructions.

14.01 Logs are used to track the activity associated with each in-service item being operated and maintained.

14.02 Operation and maintenance requirements and instructions for each type of equipment are clearly identified and readily available to users.

14.03 Modification and maintenance records are maintained for each in-service item by model or ID number and serial number.

14.04 As-built records are appended with each modification and conformance is verified before the modification order (work authorization) may be closed.

15.0 HUMAN RESOURCES AND TRAINING

Human resources coordinates the establishment of job categories and skill levels for compensation purposes. It is recognized that the Change Specialist I and II positions are new and require the skills of a program manager. It is also recognized that the role of configuration management is expanded significantly and its level of importance is elevated accordingly.

15.01 New employee orientations include reviewing the hierarchy of administrative requirements (strategic business plan, operating standards and procedures).

15.02 Job responsibilities and required skills for each position are defined in position guides and are available on-line.

15.03 Compensation guidelines for each skill level within each job category or career path are shared with each employee during performance reviews.

16.0 FINANCIAL ACCOUNTING AND REPORTING

Like all other core business processes, the activities of financial accounting and reporting are accomplished in accordance with operating standards and administrative procedures. Their specific operating standards are included in the complete set that is consolidated by the owner of the core CM process and validated by all other core business process owners. Each core process owner thereby knows precisely what the other core process owners do.

- 16.01 Cost accounting is activity-based and costs are collected from the forms used to authorize and control work.**
- 16.02 Annual financial reports include a description of the scope and adequacy of internal controls and procedures used to organize and prepare those reports.**
- 16.03 Resources spent on corrective action (intervention) are tracked and reported for each core business process and each business program.**
- 16.04 Product and process improvements are authorized and tracked by ECN and costs versus benefits are measured and reported.**

17.0 PROCESS OVERSIGHT AND INTERNAL AUDIT

The primary purpose of internal audit is to protect the company's assets and intellectual property. The purpose of process oversight is to ensure that the organization is doing what it is supposed to be doing. Their role is to identify and report gaps or potential deficiencies.

- 17.01 Confirm that the strategic business plan is being properly maintained and that the core business processes and their owners are correctly identified.**
- 17.02 Monitor how the core business process owners work together to achieve a truly integrated and validated set of operating standards.**
- 17.03 Monitor actual usage of the administrative procedures and the results and confirm that the operating standards are truly being achieved.**