

Configuration Management

Giving organisations the information they need to make sure their products perform as intended

Expert knowledge means success



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Note: This publication has not been updated since it was last published. Some of the hyperlinks may have changed and may need updating. In addition, some of the information in this publication may be out of date.

What is Configuration Management?

Today, customers want more. They want cheap products, they expect fast delivery, and they want products and services tailored to increasingly exacting expectations.

First used in Aerospace and Defence, Configuration Management (CM) applications are now sought in virtually every industry. It's the only fully developed management discipline that directly focuses on managing a product's viability. CM is both a management discipline and a process¹:

- The purpose of both is really quite simple and elegant. CM is designed to ensure that organizations have the information they need to make sure their products perform as intended;
- Other management disciplines and processes are designed to control and optimize costs, schedules, and resource allocations. Whilst these tools work very well and have attracted billions in information technology investments while raising productivity and competitiveness to historic levels, all of these processes and systems are pointless if you cannot employ them to make the right product for a customer. CM closes this gap;
- CM is unique in its focus on controlling outcomes. It makes sure these engines of efficiency are marshalled together to produce the right product. It also controls change, making sure that its impact is assessed and that every effort is made to prevent erosion of product functionality or safety.

CM is the detailed recording and updating of information that describes an organisation's computer systems and networks, including all hardware and software components. It usually includes the versions and updates that have been applied to installed software packages and the locations and network addresses of hardware devices. When a system needs a hardware or software upgrade, a computer technician can access the configuration management program and database to see what is currently installed. The technician can then make a more informed decision about the upgrade needed.

Thus, CM is the process of identifying and defining the items in the system, controlling the change of these items throughout their lifecycle, recording and reporting the status of items and change requests, and verifying the completeness and correctness of items.

An advantage of a configuration management application is that the entire collection of systems can be reviewed to make sure any changes made to one system do not adversely affect any of the other systems. With CM, design and development meet the objectives of the customer the first time. Data and changes are recorded so that the product can be repeated exactly with minimal human intervention. New innovations more timely and cost-effective because data is accurate and can be readily re-used.

Configuration management is also used in software development, where it is called Unified Configuration Management (UCM). Using UCM, developers can keep track of the source code, documentation, problems, changes requested, and changes made.

Best IT Practice

Configuration management is a "best practices" IT process that looks to identify, document, control, and track the configuration of interrelated and interdependent software, hardware, and networking components throughout their life cycles. It can be broken down into four stages:

Configuration Identification

Get a "snapshot" of your existing body of components and how they are configured, as well as documents and other products under IT control in order to create a baseline. This will be a solid point of reference against which you can measure all actual or proposed changes.

1

Configuration Control

Create a formal management process to control changes and minimize risk. This process must include a single channel through which all "events are carefully recorded, evaluated, prioritized, scheduled, and tracked until system changes have been successfully completed."

2

Configuration Auditing

Verify that the set of configuration components are complete to ensure that the process has been executed effectively and meets best practices. This also ensures that

3



"Configuration Management (CM) is a field of management that focuses on establishing and maintaining consistency of a system or product's performance and its functional and physical attributes with its requirements, design, and operational information throughout its life."
Source: Wikipedia

"Configuration management (CM) is the detailed recording and updating of information that describes an enterprise's hardware and software. Such information typically includes the versions and updates that have been applied to installed software packages and the locations and network addresses of hardware devices."
Source: <http://searchcio-midmarket.techtarget.com/definition/configuration-management>

everyone involved has complied with agreed upon policies, processes, and procedures.

Status Accounting

Keep an ongoing record including the status and history of all components outlined in the baseline, as well as any proposed changes to the components, the status of those change requests, any interdependencies or effects on the network that each component has, etc. This disciplined process of treating your network as an interconnected, organic whole and planning for changes with this fact in mind will bring:

- Greater control over interrelated components, ensuring higher levels of availability and performance.
- The reduction of non-essential changes to the network.
- Increased accountability of developers and systems maintenance staff.
- A clearer picture of how applications and networks have evolved to their current state.
- A more organised and structured approach to overseeing an application or system's life cycle.

4

A Configuration Management tool should:

- Manage software/product versions throughout the development life cycle;
- Guarantee source to object integrity;
- Support and manage parallel (concurrent) development;
- Allow identification of all components that comprise a particular change or release;
- Provide the ability to identify and revert to a previous baseline;
- Provide automated 'build' facilities;
- Enable role based security;
- Provide audit facilities and reporting tools.

Capability Maturity Model[®]

The Capability Maturity Model² (CMM) developed by the Software Engineering Institute, is a framework describing the key elements of an effective software process. It consists of a five level model of organisational software process improvement providing an evolutionary path from an ad hoc, immature process to a mature,

disciplined process³.

CMM is a description of the stages through which software organizations evolve as they define, implement, measure, control, and improve their software processes. This model provides a guide for selecting process improvement strategies by facilitating the determination of current process capabilities and the identification of the issues most critical to software quality and process improvement⁴.

The five maturity levels describe successive stages for continuous process improvement starting with the initial level where software is developed in an ad-hoc manner, through the repeatable level, where basic management controls are introduced, the defined level, where an organisation wide process is introduced, the managed level, where measurement is introduced and finally to the optimising level. An advantage of the maturity levels is that they prioritise the steps involved in process improvement, identifying the improvements that will provide the most effective short-term benefits. A key feature of the CMM is its capability for continuous improvement, where an organisation will continually strive to improve and refine its software process.

Structure

Maturity Levels

A layered framework providing a progression to the discipline needed to engage in continuous improvement (It is important to state here that an organisation develops the ability to assess the impact of a new practice, technology, or tool on their activity. Hence it is not a matter of adopting these - rather it is a matter of determining how innovative efforts influence existing practices. This really empowers projects, teams, and organizations by giving them the foundation to support reasoned choice).

Key Process Areas

Key process area (KPA) identifies a cluster of related activities that, when performed collectively, achieve a set of goals considered important.

Goals

The goals of a key process area summarize the states that must exist for that key process area to have been implemented in an effective and lasting way. The extent to which the goals have been accomplished is an indicator of how much capability the



organization has established at that maturity level. The goals signify the scope, boundaries, and intent of each key process area.

Common Features

Common features include practices that implement and institutionalize a key process area. These five types of common features include: Commitment to Perform, Ability to Perform, Activities Performed, Measurement and Analysis, and Verifying Implementation.

Key Practices

The key practices describe the elements of infrastructure and practice that contribute most effectively to the implementation and institutionalization of the key process areas.

CMII – the advanced version of CM

CMII is an advanced version of CM:

- CM is the process of managing products, facilities and processes by managing their requirements, including changes, and assuring conformance in each case.
- CMII is a process for accommodating change and keeping requirements clear, concise and valid. Every organisation needs this capability regardless of what it is called. Such a process has universal application. Organisations that do it best are most competitive.

CMII grew out of product engineering and manufacturing. The Institute of Configuration Management has extended it to software development and process management:

- Applied intelligently, CMII can benefit the enterprise even more widely. It is not only a cost reduction tool, but a management strategy to improve profitability and provide long-term advantage;
- When working within large organisations, CMII proponents should consider an incremental approach - applying whatever CMII principles can yield short-term results, support from key people, and a basis for further progress.

Recommended Reading

- Software Configuration Management Strategies and Rational Clearcase, by Brian White, published by Addison Wesley; ISBN: 0201604787.
- A Guide to Software Configuration Management, by Alexis Leon, published by Artech House; ISBN: 1580530729.
- Practical CM: Best Configuration Management Practices for the 21st Century, by David D. Lyon, published 2000 by Butterworth-Heinemann; ISBN: 0750647248.
- Configuration Management: The Missing Link in Web Engineering, by Susan Dart, published by Artech House Books; ISBN: 1580530982.
- Practical Software Configuration Management: The Latenight Developer's Handbook (Bk/Cd-ROM), by Tim Mikkelsen, Suzanne Pherigo, published by Prentice Hall; ISBN: 0132408546.
- Configuration Management, by George W George, published by Ovum; ISBN: 1898972761.
- Configuration Management, by Marion Kelly, published by McGraw-Hill Publishing Company; ISBN: 0077079779.
- Implementing Configuration Management, by Fletcher J. Buckley, published IEEE Press; ISBN: 0780304357 (paperback) or IEEE Computer Science Press; ISBN: 0818671866.
- Configuration Management Tools, by Pat Ingram, by Ovum; ISBN: 0903969823.
- Fundamentals of Configuration Management, by Thomas T Samaras, Frank L Czerwinski, published by Interscience; ISBN: 0471751006.
- System Configuration Management, J. Estublier (Editor), published by Springer-Verlag Berlin and Heidelberg GmbH & Co. KG; ISBN: 354066484X.
- Configuration Management Tools, by William Rigg, published by Ovum; ISBN: 1898972109.
- Configuration Management Best Practices: Practical Methods That Work in the Real World, by Robert Aiello and Leslie Sachs, published by Addison Wesley; ISBN-10: 0321685865, ISBN-13: 978-0321685865.

The Best CM Process

The best CM process is one that can best:

- (1) Accommodate change;
- (2) Accommodate the re-use of proven standards and best practices;
- (3) Assure that all requirements remain clear concise and valid;
- (4) Communicate (1), (2) and (3) promptly and precisely; and
- (5) Assure that the results conform in each case.

CMII is CM plus continuous improvement in all five of the above.



Further Information

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This guide is for general interest and is only a brief introduction to Configuration Management - it is always essential to take advice on specific issues. We believe that the facts are correct as at the date of publication, but there may be certain errors and omissions for which we cannot be responsible.

References:

¹ See Configuration Management Information Center at: www.pdmic.com/cmhc/introtoCM.shtml

² Capability Maturity Model and CMM are registered in the U.S. Patent and Trademark Office.

³ Source: European Software Institute

⁴ Source: European Software Institute

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