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Document Purpose

This Practices Guides is a brief document that provides an overview describing the best practices, activities, attributes, and related templates, tools, information, and key terminology of industry-leading project management practices and their accompanying project management templates.

Background

The Department of Health and Human Services (HHS) Enterprise Performance Life Cycle (EPLC) is a framework to enhance Information Technology (IT) governance through rigorous application of sound investment and project management principles, and industry best practices. The EPLC provides the context for the governance process and describes interdependencies between its project management, investment management, and capital planning components. The EPLC framework establishes an environment in which HHS IT investments and projects consistently achieve successful outcomes that align with Department and Operating Division goals and objectives.

Since its development by the United States Department of Defense in the 1950s, the concepts and practices of configuration management (CM) have been widely adopted by numerous management models such as Capability Maturity Model Integration (CMMI), ISO 9000, and COBIT. As an example, the Information Technology Infrastructure Library (ITIL) recognizes CM as a service component in which all of the other ITIL processes come into regular contact.

Practice Overview

Configuration Management (CM) is the discipline of identifying, recording, evaluating, tracking, coordinating, reporting, and controlling Configuration Items (CI) by performing supporting process activities that maintain the integrity of these items throughout the life cycle of a project, including their versions, constituent components and relationships. A CI is a project artifact that can be individually managed and versioned, and has been placed under configuration management (CM) control. A CI may be anything that makes up a CM environment and should be recorded as part of the CM system. This includes but is not limited to hardware, software, documentation, and the physical relationships and logical dependencies between these CI. Some common CM activities include:

- Identifying, defining, and baselining configuration items
- Controlling modifications and releases of configuration items
- Reporting and recording status of configuration items and any requested modifications
- Ensuring completeness, consistency, and correctness of configuration items
- Controlling storage, handling, and delivery of the configuration items

The goals of using CM are to ensure the integrity of a product and to make its evolution more manageable. Effective CM imposes control over the otherwise unmanageable activities that require the updating and using of multiple versions of project artifacts. It is vital that the performing organization/project have in place a clearly defined CM process to manage the unique complexities of each product. This combined with well defined, documented, and accepted CM processes and procedures, and strict adherence to them, are necessary for a project team to effectively work with CM tools. This allows for the combined ability to build, deploy, correct, and update project artifacts and, if necessary, recreate earlier version of products.

IEEE standard 729-1983 for Configuration Management and the Information Technology Infrastructure Library (ITIL) Framework both highlight four classic operational aspects of CM:

- **Identification:** An identification scheme is needed to reflect the structure of the product. This involves identifying the structure and kinds of components, making them unique and accessible in some form by giving each component a name, version identification, and configuration identification.

- **Control:** Control the release of a product and changes to it throughout the lifecycle by having controls in place that ensure consistent software via the creation of a baseline product. This often involves implementing policies and processes to manage change both internally within the performing organization as well as change requests coming from external sources such as client requests and regulatory changes.
- **Status:** Record and report the status of components and change requests, and gathering vital statistics about the product.
- **Audit/Review:** Validate the completeness of a product and maintaining consistency among the components by ensuring that they are in an appropriate state throughout the entire project life cycle and that the product is a well-defined collection of components
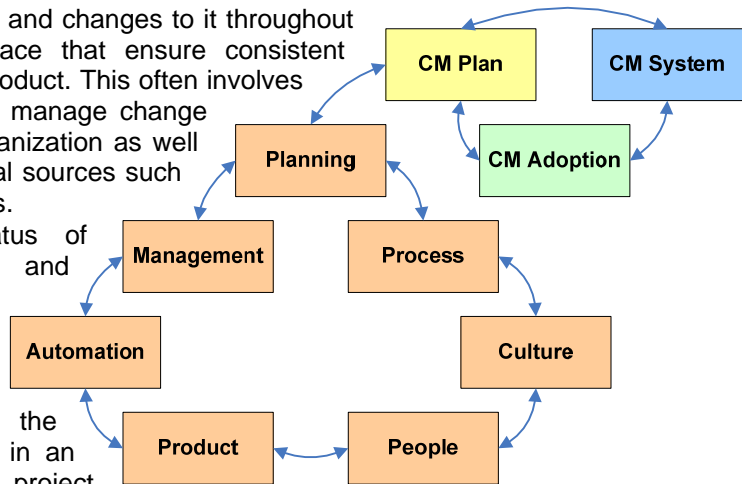
Keeping these definitions in mind, there are ten key elements to identifying and addressing the CM needs of an organization. The first seven relate to preparation, planning, and performing the necessary work. The other three are the results of the previous seven.

- **Planning:** Identifying, resolving, and documenting in the CM plan the objectives of the CM initiative and related organizational relationships, tools, resources, internal and external dependencies, policies, procedures, federal regulations, etc.
- **Process:** Defining the actual CM process and what level of control will be enforced upon its implementation
- **People:** Identifying and defining all the various roles and responsibilities of those working on and impacted by the CM initiative
- **Culture:** Understanding the organizational culture as it exists before the implementation of CM and how the impact of incorporating CM tools, processes, and practices will impact that culture. Plan approaches to mitigate any potential issues
- **Product:** Determining what product(s) and part of product(s) will be placed under CM
- **Automation:** Deciding on the requirements for the functionality of an automated CM system
- **Management:** Resolving managerial decisions associated with the CM solution such as buying or building a CM solution

The next three elements are the outputs of the above efforts and are key to any successful CM solution.

- **CM plan:** The actual document that summarizes the needs, planning, processes, procedures, policies, schedules, responsibilities, etc. defined to integrate a CM system within an organization
- **CM system:** The tool(s) chosen to assist in automating parts of the CM process. Choosing the most appropriate tool(s) for the performing organization requires extensive expertise in CM. In addition, tool review an approval by all appropriate authorizing individual(s) and/or department will be required prior to any selection. Often organizations have CM tools in place that are recognized as standards to be used by all projects. However, if this is not the case, some CM tools to consider may include:
  - o Visual SourceSafe
  - o Visual Studio Team Foundation Server
  - o StarTeam
  - o ClearCase
  - o CVS (open source)
  - o Subversion (open source)
  - o CruiseControl (open source)
- **CM adoption strategy:** The strategy implemented by an organization when adopting a CM processes and/or system

CM is implemented to keep the inevitable changing of project artifacts under control by eliminating the confusion, and errors that result, from dealing with multiple versions of project artifacts. Successful CM requires well-defined policies, procedures, and standards that clearly define things such as:

- What CIs are currently under CM
- How artifacts enter and exit CM
- How CIs and other artifacts are named

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- How CIs are allowed to change
- How different versions of CIs are tracked, made available, and can be used
- What CI information will be reported and how will CI records be maintained
- What CM tools are used to enable to enforce CM

This and other relevant information, policies, and standards should be documented within a Configuration Management Plan (CMP). The CMP is used to document and inform project stakeholders about CM within the organization, what CM tools and processes will be used, and how they will be applied by the project. In addition, components of the CMP are also used to manage the implementation of the CM system.
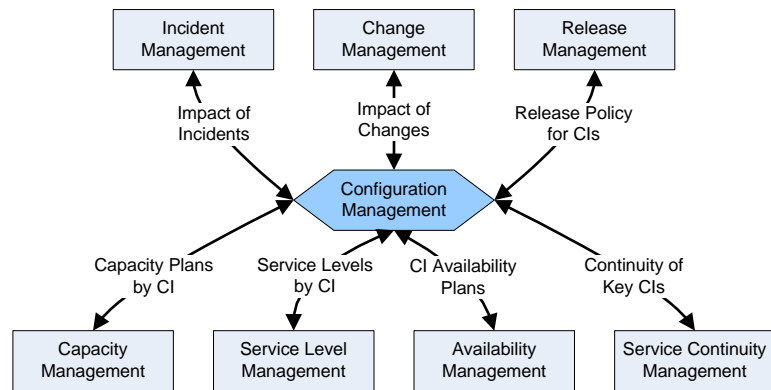
Once implemented, every other process, directly or indirectly, interacts with the CM system. ITIL Framework defines a number of process groups and how each group benefits from timely and accurate CM data and processes. This relationship is illustrated in the image to the right.

It's important to note that a CM system can be very complex and often requires a subject matter expert experienced in CM and related tools to effectively structure and implement a feasible CM system. The information within this practices guide provides only a high-level overview of CM and its components. Due to the complexity of the topic a best practice may be to consider outsourcing the effort or at least involving a CM subject matter expert in the planning and ongoing operations of any CM system.

Best Practices

- **Plan** – The goal of CM planning is to address CM related items/policies before they become issues
- **Experts** – Involve CM subject matter experts in planning and ongoing operations of any CM system
- **Developer Workspace** – Don't share, or work outside managed, workspaces defined by the CM tools and policies used by the performing organization
- **Branching Code** – Branch only when absolutely necessary
- **Builds** – Check-in all original source code before building an executable product. Use common build tools, build often, and keep a build log for future reference
- **Change** – Managing change is a key component to successful CM. Managing changes to product versions is often done through the use of a CM tool. Managing what changes will impact the base product is often done through the use of a change management process. Depending on the size and/or complexity of the project this activity may require the use of a Change Control Board. A CCB is a committee constructed of project stakeholder that makes decisions regarding whether or not proposed changes to a software project should be implemented

Practice Activities

- Identify resolve, document and plan for CM implementation
- Define CM processes
- Identify and define roles and responsibilities, and business process and organizational changes
- Understand and plan for organization culture impacts resulting from CM implementation
- Determine what product(s) or part of product(s) will be placed under CM
- Identify what functionality requirements are required for the CM solution
- Finalize a make or buy decision
- Document a CM plan
- Finalize the CM system choice and adoption strategy
- Execute the CM plan