Achieving CMMI Level 2 in the Configuration Management Process Area Using IBM Rational Software Solutions

by Rolf W. Reitzig
Founder
Cognence, Inc.

John B. Miller
Independent Senior Consultant

Raymond L. Kile
Chief Engineer for Process Improvement
Center for Systems Management (CSM)

Dave West
Group Manager, Segments
Rational Software
IBM Software Group

In the January issue of The Rational Edge, Rolf W. Reitzig published an overview of how the Rational Unified Process®, or RUP®, as well as other IBM Rational software solutions, can help organizations achieve the Capability Maturity Model® Integration (CMMI®) Level 2. This article continues that exploration. From a high-level perspective, it describes how the CMMI views configuration management, and discusses how IBM Rational solutions satisfy the Configuration Management Process Area’s specific and generic goals and practices. We will look at the Level 2 requirements for this area as a solid foundation for reaching CM maturity Level 3. If IBM Rational solutions do not fully address a particular practice, we will make recommendations as to how an organization might satisfy the practices to attain Level 2.
The matrix in the Appendix describes each CMMI CM goal/practice and then lists the Rational Unified Process (RUP) role that might be responsible for satisfying the practice; what RUP process, procedure, template, or Rational tool might help satisfy the practice; any other observations and recommendations that might be relevant.

Throughout this article, we will use italics to indicate material taken directly from the CMMI.

Assumptions

The CMMI appraisal model is a verification-based audit that essentially follows the "Say what you do, do what you say, and prove it" concept. This means that organizations that wish to achieve a CMMI maturity Level 2 rating must document various management and engineering practices, execute them as documented, and be able to prove it via quality records and/or project artifacts.

During an appraisal, an SEI Authorized Lead Appraiser and qualified appraisal team members look for objective evidence that the organization has implemented and institutionalized the practices by examining direct artifacts, indirect artifacts, and affirmations. Direct artifacts are tangible work products directly created as a result of implementing a practice (e.g., a project plan or CM plan), Indirect artifacts are a side effect of implementing the practice or otherwise indicate the practice was performed (e.g., meeting minutes, reviews, logs). Affirmations are oral or written statements confirming or supporting the practice was implemented.

This article assumes that the organization has:

1. Adopted and implemented the Rational Unified Process, or RUP.
2. Uses RUP as documented.
3. Creates the artifacts as defined by RUP.
4. Uses project plans that detail how the project team will implement the configuration management process area and describe the role of RUP in that implementation.

Steps Toward Level 2

The combination of RUP, Rational® ClearCase,® Rational® ClearQuest,® and Unified Change Management (UCM), provide much of the solution needed to meet Level 2 requirements in the Configuration Management (CM) process area.

For organizations that are adopting IBM Rational best practices and tools from the ground up, or those wanting to tailor already existing installations, the following steps provide a high-level framework for a successful implementation.
1. Understand the current status of configuration management.
   a. Perform a CMMI-based appraisal of the configuration management process area in the organization
   b. Document strengths, as well as gaps and deficiencies identified during the appraisal.

2. Plan the implementation.
   a. Based on the results of the CMMI-based appraisal, determine the work products needed for successful implementation.
      i. Organizational policy
      ii. Organizational configuration management plan template
      iii. High-level organizational configuration management process
      iv. Required documented procedures
      v. Project-specific CM orientation and training materials
      vi. Measurements needed to support status of configuration management activities, and continuous improvement
   b. Determine the steps necessary for successful implementation (a tailored version of this list).
   c. Determine the number of resources required.
      i. Number of Rational ClearQuest, Rational ClearCase, and RUP licenses
      ii. Other hardware and software resources to support the configuration management infrastructure
      iii. Personnel to support the configuration management planning and rollout
      iv. Personnel to support configuration management on an ongoing basis
      v. Tool and process training
      vi. Project-specific implementation training
   d. Determine stakeholders who should review and approve the CM rollout plan.
   e. Determine if out-of-the-box UCM will be implemented, or whether a customized Rational ClearQuest/Rational ClearCase implementation will be installed.
   f. Develop the configuration management implementation plan and obtain approval from stakeholders.

3. Roll out the implementation.
   a. Tool implementation
i. Install and configure Rational ClearQuest, Rational ClearCase, RUP, and UCM.

ii. Develop necessary reports to satisfy CMMI requirements.

b. Develop and approve project-specific plans and procedures (for each project).
   i. Project-specific configuration management plan
   ii. Project-specific configuration management procedures

c. Orientation and training (for each project)
   i. Publicize the organizational policy for configuration management to all team members.
   ii. Deliver "body of knowledge" configuration management training to appropriate project team members.
   iii. Deliver IBM Rational process and tool training to the appropriate project team members.
   iv. Deliver project-specific configuration management implementation training to all project team members.

d. Project-specific configuration management implementation
   i. Bring configuration items into Rational ClearCase.
   ii. Track and control changes/manage configuration items.
   iii. Create/manage baselines and releases.

e. Manage and track the configuration management implementation plan.

4. Oversee the implementation.
   a. Evaluate the configuration management rollout against the plan.
   b. Perform configuration audits.
      i. Physical
      ii. Functional
   c. Evaluate project-specific implementation of configuration management against the project-specific configuration management plan and organizational guidance by:
      i. The project manager
      ii. The quality assurance organization
      iii. Senior management
   d. Improve the implementation based on measurements and metrics, project team feedback, and management oversight.
The Configuration Management Process Area

[Note: The italicized text below was taken directly from the CMMI.]

The purpose of Configuration Management is to establish and maintain the integrity of work products using configuration identification, configuration control, configuration status accounting, and configuration audits.

The CM process area involves the following:

- Identifying the configuration of selected work products that compose the baselines at given points in time.
- Controlling changes to configuration items.
- Building or providing specifications to build work products from the configuration management system.
- Maintaining the integrity of baselines.
- Providing accurate status and current configuration data to developers, end users, and customers.

The work products placed under configuration management include the products that are delivered to the customer, designated internal work products, acquired products, tools, and other items that are used in creating and describing these work products. Examples of work products that may be placed under configuration management include plans, process descriptions, requirements, design data, drawings, product specifications, code, compilers, product data files, product technical publications.

Configuration management of work products may be performed at several levels of granularity. Configuration items can be decomposed into configuration components and configuration units. Therefore, in these practices, "configuration item" may be interpreted as "configuration component" or "configuration unit" as appropriate.

Baselines provide a stable basis for continuing evolution of configuration items. An example of a baseline is an approved description of a product that includes internally consistent version of requirements, requirements traceability matrices, design, software/hardware configurations, and end-user documentation. Baselines are added to the configuration management system as they are developed. Changes to baselines and the release of work products built from the configuration management system are systematically controlled and monitored via the configuration control, change management, and configuration auditing functions of configuration management.

This process area applies not only to configuration management on projects, but also to configuration management on organization work products such as standards, procedures, and reuse libraries. This process area covers the practices for performing the configuration management
function and is applicable to all work products that are placed under configuration management.

Refer to Figure 1 for a graphical representation of the Configuration Management process area.

![Figure 1: Graphical Representation of the Configuration Management Process Area](image)

**Satisfying Specific Goals and Practices in the Configuration Management Process Area**

[Note: The italicized text below was taken directly from the CMMI.]

The Configuration Management process area's specific goals and the practices that support those goals are:

**Specific Goal 1 (SG 1) Baselines of identified work products are established**

Specific practices to establish baselines are covered by this specific goal. The specific practices under the Track and Control Changes specific goal serve to maintain the baselines. The specific practices of the Establish Integrity specific goal document and audit the integrity of the baselines.

**Specific Practice 1.1 (SP 1.1) Identify the configuration items, components, and related work products that will be placed under configuration management**

Configuration identification is the selection, creation, and specification of the following:

- Products that are delivered to the customer
- Designated internal work products
Items under configuration management will include specifications and interface documents that define the requirements for the product. Other documents, such as test results, may also be included, depending on their criticality to defining the product.

A "configuration item" is an entity designated for configuration management, which may consist of multiple related work products that form a baseline. This logical grouping provides ease of identification and controlled access. The selection of work products for configuration management should be based on criteria established during planning.

Configuration items can be decomposed into configuration components and configuration units. Only the term "configuration item" is used in this process area. In these practices, "configuration item" may be interpreted as "configuration component" or "configuration unit" as appropriate. For example, configuration items in the area of requirements management could vary from each individual requirement to a set of requirements.

Typical work products include:

- Identified configuration items

**SP 1.1 Implementation Approach**

By following the "Configuration Management->Plan Project Configuration Management and Change Control->Write CM Plan" activity, the project should identify configuration items documented in RUP's Software Configuration Management Plan (SCMP) template. In order to meet the intent of this goal, each project team must identify the items placed under configuration control. A filled out SCMP template for each project satisfies this requirement.

**Specific Practice 1.2 (SP 1.2) Establish and maintain a configuration management and change management system for controlling work products**

A configuration management system includes the storage media, the procedures, and the tools for accessing the configuration system.

A change management system includes the storage media, the procedures, and tools for recording and accessing change requests.

Typical work products include:

- Configuration management system with controlled work products
- Configuration management system access control procedures
SP 1.2 Implementation Approach

Installing and configuring Rational ClearCase, Rational ClearQuest, and UCM provides the foundation for establishing a configuration and change management system. The RUP activity, "Configuration and Change Management->Create Project CM Environments" gives guidance on how to accomplish this. The RUP role of Tool Specialist is responsible for managing the system.

Any type of project work product can be managed through Rational ClearCase, including requirements, documents, code, plans, and so forth.

Implicit in the CMMI is the expectation that a part of the CM system includes documented access control procedures. Since RUP/UCM does not provide detailed documented procedures, the project must create and maintain these either as part of the SCMP or as a separate "project procedures" document. These project procedures should also document the roles and responsibilities for CM personnel on the project as well as those in the larger organization. The documentation should include specific assignment of responsibility and accountability for managing the project's configuration (i.e., control authority).

Specific Practice 1.3 (SP 1.3) Create or release baselines for internal use and for delivery to the customer

A baseline is a set of specifications or work products that has been formally reviewed and agreed upon, that thereafter serves as the basis for further development, and that can be changed only through change control procedures. A baseline represents the assignment of an identifier to a configuration item and its associated entities.

For software engineering, a set of requirements, design, source code files, and the associated executable code, build files, and user documentation (associated entities) that have been assigned a unique identifier can be considered to be a baseline. Release of a baseline constitutes retrieval of source code files (configuration items) from the configuration management system and generating executable files. A baseline that is delivered to a customer is typically called a "release" whereas a baseline for an internal use is typically called a "build."

Typical work products include:

- Baselines
- Description of baselines

SP 1.3 Implementation Approach

Management->Manage Baselines and Release->Promote Baselines," and "Configuration and Change Management->Manage Baselines and Releases->Create Deployment Unit" address how a project creates and releases baselines.

By coupling RUP with Rational ClearCase and Rational ClearQuest, projects can address this specific practice almost completely. The project team will have to document build and release procedures, and ensure that they create proper reports that adequately describe baselines.

**Specific Goal 2 (SG 2) Changes to the work products under configuration management are tracked and controlled**

The specific practices under this specific goal serve to maintain the baselines after they are established by the specific practices under the Establish Baselines specific goal.

**Specific Practice 2.1 (SP 2.1) Track change requests for the configuration items**

Change requests address not only new or changed requirements, but also failures and defects in the work products.

Change requests are analyzed to determine the impact that the change will have on the work product, related work products, and schedule and cost.

*Typical work products include:*

- Change requests

**SP 2.1 Implementation Approach**

Under the RUP process "Configuration and Change Management->Manage Change Requests," the activities "Submit Change Requests," "Update Change Requests," and "Review Change Requests" address how the specific practice can be satisfied. Rational ClearQuest serves as the change request database.

The project will have to document the procedures used for entering and updating change requests.

**Specific Practice 2.2 (SP 2.2) Control changes to configuration items**

Control is maintained over the configuration of the work product baseline. This control includes tracking the configuration of each of the configuration items, approving a new configuration if necessary, and updating the baseline.

*Typical work products include:*
- Revision history of configuration items
- Archives of the baselines

**SP 2.2 Implementation Approach**

Rational ClearCase provides control over configuration items; it also provides a revision history of CIs and archives of baselines. The RUP activities "Schedule and Assign Work," "Make Changes," and "Deliver Changes" under the "Configuration Management->Change and Deliver Configuration Items" process show how this should be accomplished.

The project must document procedures used for checking in, checking out, obtaining revision history, and accessing archives of baselines.

**Specific Goal 3 (SG 3) Integrity of baselines is established and maintained**

The integrity of the baselines, established by processes associated with the Establish Baselines specific goal, and maintained by processes associated with the Track and Control Changes specific goal, is provided by the specific practices under this specific goal.

**Specific Practice 3.1 (SP 3.1) Establish and maintain records describing configuration items**

Typical work products include:

- Revision history of configuration items
- Change log
- Copy of change requests
- Status of configuration items
- Differences between baselines

**SP 3.1 Implementation Approach**

Rational ClearQuest and Rational ClearCase can provide the records required to satisfy this key practice. Rational ClearCase provides a change history/log of configuration items, as well as the status of configuration items and differences between baselines. Rational ClearQuest provides access to change requests. The RUP process "Configuration and Change Management->Change and Deliver Configuration Items," and activities "Make Changes" and "Deliver Changes" apply.

Procedures used to create these reports need to be documented.

**Specific Practice 3.2 (SP 3.2) Perform configuration audits to maintain integrity of the configuration baselines**

Audit configuration management activities and processes to confirm that
the resulting baselines and documentation are accurate, and record the audit results as appropriate.

Typical work products include:

- Configuration audit results
- Action items

**SP 3.2 Implementation Approach**

The RUP activity "Configuration and Change Management->Monitor and Report Configuration Status->Perform Configuration Audits" provides guidance on this CMMI requirement. The project needs to document how these audits will be conducted.

**Satisfying Configuration Management Process Area Generic Goals and Practices**

[Note: The italicized text below was taken directly from the CMMI.]

The Configuration Management process area's generic goals, and the practices that support those goals are:

**Generic Goal 2 (GG 2) The process is institutionalized as a managed process**

This generic goal must be satisfied to reach maturity Level 2 in the configuration management process area. The intent of this goal is to ensure that a project puts in place, follows, and sustains a set of processes and that the organization institutionalizes these processes.

The generic practices that map to the generic goal include ways for the project to

- Follow a policy.
- Plan its process and its work.
- Provide resources and assign responsibility to perform the process and project work.
- Train its personnel on the process, tools, and additional required knowledge for each process area.
- Manage and control project work products and processes.
- Evaluate how well it adheres to the identified process.
- Review project status with project management and senior management.

RUP and other Rational tools provide the foundation for a managed process. Rational process flows, roles, responsibilities, templates, oversight, and so forth, must be reviewed and tailored by the organization.
and project in order to fulfill their unique needs.

**Commitment to Perform Generic Practice 2.1 (GP 2.1 - CO 1)**  
*Establish and maintain an organizational policy for planning and performing the configuration management process*

This policy establishes organizational expectations for establishing and maintaining baselines, tracking and controlling changes to the work products (under configuration management), and establishing and maintaining integrity of the baselines.

For each process area, the CMMI requires that a written organizational policy be in place and followed by the organization via the Commitment to Perform common feature. RUP does not specifically address the need for policies (or a single, overarching policy), although the Software Engineering Process Authority (SEPA) described in RUP would be the appropriate entity to help develop the policies. Typically, these policies are authorized or signed by a senior level manager in the organization.

An organization must establish, publicize, and maintain a configuration management policy to comply with this generic practice.

**Ability to Perform Generic Practice 2.2 (GP 2.2 - AB 1)**  
*Establish and maintain the plan for performing the configuration management process*

This plan for performing the configuration management process can be included in (or referenced by) the project plan, which is described in the Project Planning process area.

By completing and maintaining RUP's software configuration management plan (SCMP) via the template provided, a project satisfies this Ability to Perform generic practice. Various documented procedures related to configuration management can be documented as appendices to the SCMP.

The RUP activity that satisfies this generic practice is Configuration and Change Management->Plan Project Configuration and Change Control.

**Ability to Perform Generic Practice 2.3 (GP 2.3 - AB 2)**  
*Provide adequate resources for performing the configuration management process, developing the work products, and providing the services of the process*

Examples of resources provided include the following tools:

- Configuration management tools
- Data management tools
- Archiving and reproduction tools
- Database programs
Organizations can map the required CMMI resources to RUP roles, keeping in mind the CMMI activities for which those roles are responsible have to be performed, even if RUP does not address them. Of course, funding must be provided if the roles are to effectively perform their responsibilities. The RUP activity Project Management->Develop Software Development Plan->Define Project Organization & Staffing is the appropriate place to define and plan for the necessary roles.

The RUP activity Select and Acquire Tools is the appropriate place for planning the configuration management toolset and environment.

**Ability to Perform Generic Practice 2.4 (GP 2.4 - AB 3) Assign responsibility and authority for performing the process, developing the work products, and providing the services of the configuration management process.**

Similar to the previous Ability to Perform generic practice, the RUP activity Project Management->Develop Software Development Plan->Define Project Organization and Staffing is the appropriate place to assign responsibility and authority for performing the configuration management process.

**Ability to Perform Generic Practice 2.5 (GP 2.5 - AB 4) Train the people performing or supporting the configuration management process as needed**

Examples of training topics include the following:

- Roles, responsibilities, and authority of the configuration management staff
- Configuration management standards, procedures, and methods
- Configuration library system

This CMMI Ability to Perform common feature requires various roles and groups in the organization to be trained or oriented in configuration management. Informal training/orientation can be provided by the RUP itself; it is Web-based and can be available to all project team members via a Web browser.

Rational University provides many classes and workshops for acquiring formal CM process and tool training. Also, many books have been published that focus on RUP and the various best practices it advocates. Finally, a number of "body of knowledge" courses and books are available to provide specific guidance to configuration management professionals.

It is important to note that project personnel must be oriented and trained on the project-specific configuration management processes, procedures, and tools.

**Directing Implementation Generic Practice 2.6 (GP 2.6 - DI 1) Place designated work products of the configuration management process under appropriate levels of configuration management**
Examples of work products placed under configuration management include the following:

- Access lists
- Change requests status reports
- Change request database
- CCB meeting minutes
- Archived baselines

Like code modules, project plans and specifications must also be managed. By placing the configuration management process descriptions, plans, procedures, and policies under configuration management, this generic practice can be satisfied.

The RUP activities that satisfy this generic practice (assuming the previously identified items are managed) are: "Schedule and Assign Work," "Make Changes," and "Deliver Changes."

**Directing Implementation Generic Practice 2.7 (GP 2.7 - DI 2)**  
Identify and involve the relevant stakeholders of the configuration management process as planned

Examples of activities for stakeholder involvement include the following:

- Establishing baselines
- Reviewing configuration management system reports and resolving issues
- Assessing the impact of changes for the configuration items
- Performing configuration audits
- Reviewing the results of configuration management audits

To satisfy this generic practice, it is important that the relevant project stakeholders review and approve the project's configuration management plan. By following the "Write CM Plan" activity and obtaining approval, the project will partially satisfy this practice. This practice represents a proactive effort to identify stakeholders who are directly affected by this process area and overtly planning their involvement in it. Typically, the group of relevant stakeholders is much larger than the number of signatories on the CM Plan. Care should be taken to ensure all relevant stakeholders are considered and addressed in the plan.

**Directing Implementation Generic Practice 2.8 (GP 2.8 - DI 3)**  
Monitor and control the configuration management process against the plan for performing the process, and take appropriate corrective action

Examples of measures used in monitoring and controlling include the
● Number of changes to configuration items
● Number of configuration audits conducted

Reviews required by this CMMI Verifying Implementation common feature generic practice can be satisfied by any number of the following RUP reviews:

1. Project Approval Review
2. Project Planning Review
3. Iteration Plan Review
4. PRA Project Review
5. Iteration Criteria Evaluation Review
6. Iteration Acceptance Review
7. Lifecycle Milestone Review
8. Project Acceptance Review

These project reviews can be accomplished through the Monitor Project Status activity of RUP. This activity requires that the various project team members submit status reports to the project manager.

RUP does not, however, specifically look for configuration management process status against the configuration management plan. To properly satisfy this generic practice, review minutes must show that the configuration management process is monitored and controlled.

Verifying Implementation Generic Practice 2.9 (GP 2.9 - VE 1) Objectively evaluate adherence of the configuration management process against its process description, standards, and procedures, and address noncompliance

Examples of activities reviewed include the following:

● Establishing baselines
● Tracking and controlling changes
● Establishing and maintaining integrity of baselines

Examples of work products reviewed include the following:

● Archives of the baselines
● Change request database

CMMI-required objective reviews can be easily satisfied by having RUP's "Project Reviewer" role represented at the project status meetings and
senior management reviews that are required by other Verifying Implementation generic practices. It is important for the project to undergo both configuration management process and product reviews by an objective source.

In some cases, a separate review meeting should be held to specifically address the configuration management process area. Generally, these separate reviews are defined in the organization's Quality Assurance plan.

**Verifying Implementation Generic Practice 2.10 (GP 2.10 - VE 2)**

*Review the activities, status, and results of the configuration management process with higher level management and resolve issues*

Higher-level management reviews can be accommodated by the RUP's PRA project review activity. This review requires that the project's senior management review project process activities and milestones. An outcome of this review is a Review Record, which must reflect that the project's configuration management process and products were reviewed during the activity to satisfy this Verifying Implementation generic practice.

**Note:** Further information on IBM Rational support for CMMI can be found on the Web at [www.rational.com/CMMI](http://www.rational.com/CMMI)

**Appendix**

Please [click here](http://www.rational.com/CMMI) to view the appendix

**Notes**


The Rational Unified Process, or RUP, evaluated in this article is version 2002.05.00.

2 From "CMMI v1.1 Tutorial" by Mike Phillips

*For more information on the products or services discussed in this article, please click [here](http://www.rational.com/CMMI) and follow the instructions provided. Thank you!*

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<table>
<thead>
<tr>
<th>CMMI Goal or Practice</th>
<th>Practice Description</th>
<th>RUP Role</th>
<th>RUP Process</th>
<th>RUP Procedure</th>
<th>Tool</th>
<th>Observation/ Recommendation</th>
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<tbody>
<tr>
<td>SG 1</td>
<td>Establish Baselines - Baselines of identified work products are established</td>
<td></td>
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<tr>
<td>SP 1.1</td>
<td>Identify Configuration Items - Identify the configuration items, components, and related work products that will be placed under configuration management</td>
<td>Configuration Manager, Change Control Manager</td>
<td>Configuration and Change Management, Plan Project Configuration and Change Control</td>
<td>Activity: Write CM Plan, Template: SCMP</td>
<td></td>
<td>Obs: RUP allows for the identification of all types of configuration items and work products. The CM Plan template provides a placeholder for what types of data to identify as a configuration item. Rec: Complete the RUP-supplied SCMP, identifying all CIs.</td>
</tr>
<tr>
<td>SP 1.2</td>
<td>Establish a Configuration Management System - Establish and maintain a configuration management and change management system for controlling work products</td>
<td>Configuration Manager, Change Control Manager</td>
<td>Configuration and Change Management, Create Project CM Environments</td>
<td>Activity: Write CM Plan, Template: SCMP, Activity: Setup CM Environment, Activity: Establish Change Control Process</td>
<td>ClearCase, ClearQuest</td>
<td>Obs: RUP allows for the establishment of a configuration management system that can be used by the project for requirements, documents, code, and other work products. Need to document configuration management access control procedures. This is typically done via Rational ClearCase and ClearQuest. Rec: Need to document procedures outlining all configuration and change management access, build, and report procedures.</td>
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<tr>
<td>SP1.3</td>
<td>Create or Release Baselines - Create or release baselines for internal use and for delivery to the customer</td>
<td>Integrator</td>
<td>Configuration and Change Management, Manage Baselines and Releases</td>
<td>Activity: Create Baselines, Activity: Promote Baselines, Activity: Create Deployment Unit</td>
<td>ClearCase</td>
<td>Obs: RUP allows a project to create and control baselines of the different work products. Release of baselines will need to be done by the project team. Rec: Need to document create baseline, release product, create bill of materials and other procedures outlining the set of configuration items contained in a baseline.</td>
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<td>SG 2</td>
<td>Track and Control Changes - Changes to the work products under configuration management are tracked and controlled</td>
<td>Any Role CCB</td>
<td>Configuration and Change Management, Manage Change Requests</td>
<td>Activity: Submit Change Request, Activity: Update Change Request, Activity: Review Change Request</td>
<td>ClearQuest</td>
<td>Obs: RUP provides guidance on how to manage changes. Rational ClearQuest is for tracking change requests. Rec: Need to document change request control procedures.</td>
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<tr>
<td>SP 2.1</td>
<td>Track Change Requests - Track change requests for the configuration items</td>
<td>Project Manager CCB</td>
<td>Project Management, Monitor &amp; Control Project, Configuration and Change Management, Change and Deliver Configuration</td>
<td>Activity: Schedule &amp; Assign Work, Activity: Make Changes, Activity: Deliver Changes</td>
<td>ClearCase</td>
<td>Obs: RUP provides guidance on how to manage CIs. Rational ClearCase is used for the control and management of configuration items. Rec: Need to document procedures describing how CIs are controlled.</td>
</tr>
<tr>
<td>SP 2.2</td>
<td>Control Configuration Items - Control changes to the configuration items</td>
<td>Project Manager CCB</td>
<td>Project Management, Monitor &amp; Control Project, Configuration and Change Management, Change and Deliver Configuration</td>
<td>Activity: Schedule &amp; Assign Work, Activity: Make Changes, Activity: Deliver Changes</td>
<td>ClearCase</td>
<td>Obs: RUP provides guidance on how to manage CIs. Rational ClearCase is used for the control and management of configuration items. Rec: Need to document procedures describing how CIs are controlled.</td>
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<td>SG 3</td>
<td>Establish Integrity - Integrity of baselines is established and maintained</td>
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<td>SP 3.1</td>
<td>Establish Configuration Management Records - Establish and maintain records describing configuration items</td>
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<td>Any Role</td>
<td>Configuration and Change Management, Change and Deliver Configuration Items</td>
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<td>Activity: Make Changes Activity: Deliver Changes</td>
<td>ClearCase ClearQuest</td>
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<td>Obs: ClearCase and ClearQuest can provide reports needed outlining CIs.</td>
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<td>Rec: Need to create reports detailing the status of baselines and CIs. Need to document these procedures.</td>
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<td>SP 3.2</td>
<td>Perform Configuration Audits - Perform configuration audits to maintain the integrity of the configuration baselines</td>
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<td>Configuration Manager</td>
<td>Configuration and Change Management, Monitor and Report Configuration Status</td>
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<td>Activity: Perform Configuration Audits</td>
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<tr>
<td>Template: SCMP</td>
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<td>Obs: The process exists that, when followed by the project, provides for the performing of configuration audits.</td>
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<td>Rec: Need to document these audit procedures and show evidence they are occurring.</td>
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<td>GG 1</td>
<td>Institutionalize a Managed Process - The process is institutionalized as a managed process</td>
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<tr>
<td>GP 2.1</td>
<td>Establish an Organizational Policy - Establish and maintain an organizational policy for planning and performing the configuration management process</td>
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<td>Senior Management Software Engineering Process Authority (SEPA)</td>
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<td>Obs: RUP does not provide for the creation of a policy as defined by the CMMI.</td>
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<td>Rec: The organization's senior management is responsible for creating software engineering policies. RUP Refers to the concept of the software engineering process authority (SEPA) that might drive/maintain policies. To satisfy this practice, these policies must be written, publicized, and followed.</td>
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<td>GP 2.2</td>
<td>AB 1</td>
<td>Plan the Process - Establish and maintain the plan for performing the configuration management process</td>
<td>Project Manager</td>
<td>Configuration and Change Management, Plan Project Configuration and Change Control</td>
<td>Activity: Write CM Plan</td>
<td>Template: SCMP</td>
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<tr>
<td>GP 2.3</td>
<td>AB 2</td>
<td>Provide Resources - Provide adequate resources for performing the configuration management process, developing work products, and providing the services of the process</td>
<td>Project Manager, Tool Specialist</td>
<td>Project Management, Develop Software Development Plan, Environment, Prepare Environment for Project</td>
<td>Activity: Define Project Organization and Staffing, Activity: Select and Acquire Tools</td>
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<td>GP 2.4</td>
<td>AB 3</td>
<td>Assign Responsibility - Assign responsibility and authority for performing the services of the configuration management process</td>
<td>Project Manager</td>
<td>Project Management, Develop Software Development Plan</td>
<td>Activity: Define Project Organization and Staffing</td>
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</tbody>
</table>
| GP 2.5 | AB 4 | Train People - Train the people performing or supporting the configuration management process as needed | Project Manager | Project Management, Manage Iteration | Activity: Acquire Staff | | Obs: Rational University provided training that more than adequately covers tools (ClearCase, ClearQuest) and process (RUP, UCM). Rec: CM practitioners would be required to obtain CM body of knowledge training above and beyond the training available from IBM Rational. Also, team members require training on the project's specific CM environment/processes/procedures.
| GP 2.6 | Manage Configurations - Place designated work products of the configuration management process under appropriate levels of configuration management | Project Manager | Project Management, Monitor & Control Project | Activity: Schedule & Assign Work | ClearCase | Obs: The process exists in RUP that, when followed by the project, provides for the placing of work products under control. |
| GP 2.7 | Identify and Involve Relevant Stakeholders - Identify and involve the relevant stakeholders of the configuration management process as planned | Project Manager | Project Management, Monitor & Control Project | Activity: Schedule & Assign Work | ClearQuest | Rec: Project personnel must define what appropriate work products to control, and show evidence they are being controlled. |
| GP 2.8 | Monitor and Control the Process - Monitor and control the configuration management process against the plan for performing the process and take appropriate corrective action | Project Manager | Project Management, Monitor & Control Project | Activity: Monitor Project Status | ClearCase | Obs: RUP provides guidance for stakeholders to review and approve the configuration management plan. |
|        |  |  |  |  |  | Rec: The project must identify those stakeholders, and have them review and approve the SCMP. They also need to show involvement throughout the project. |
Objectively Evaluate Adherence - Objectively evaluate adherence of the configuration management process against its process description, standards, and procedures, and address noncompliance.

| GP 2.9 | Project Manager | Project Management, Monitor and Control Project | Activity: Monitor Project Status | Obs: RUP and the supplied SQAP template tend to concentrate on the product reviews/audits, with little on how the process is evaluated. 
Rec: Need to ensure that configuration management activities are monitored by the SQA group during the Monitor Project Status activity, and that the minutes reflect the review. |
Rec: Need to ensure that software configuration management activities are reviewed during the PRA Project Review, and that the minutes reflect the process review. |

End Configuration Management