



**Serena™ ChangeMan™ ZMF  
SUPPORT FOR CMM LEVEL 2**

W H I T E P A P E R



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**“The Software CMM  
has become a  
de facto standard  
for assessing  
and improving  
software processes.”**

Software Engineering Institute  
Carnegie Mellon University

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## INTRODUCTION

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Today's dynamic computing and business environments are the result of a technical evolution process unmatched until the present day. Add in the Internet and the complexities become exponential. It is now common for a company to solely exist because of and for Internet business. However, Blue Chips, Internets and everything in between are face-to-face with the critical importance of being able to track and manage their business applications and the changes to this lifeblood. The impact of application downtime has never before been subject to so much internal and external attention. The ability to do business 7x24 in a global marketplace has become a requirement, and not a nicety.

As organizations around the world search for standards and guidance to measure and achieve a mature process for managing this change, they often find themselves reviewing the Capability Maturity Model (CMM) developed by Carnegie Mellon University's Software Engineering Institute (SEI). According to the SEI, "The Capability Maturity Model for Software (CMM or SW-CMM) is a

model for judging the maturity of the software processes of an organization and for identifying the key practices that are required to increase the maturity of these processes."

"The SW-CMM was developed by the software community with stewardship by the SEI. The Software CMM has become a de facto standard for assessing and improving software processes. Through the SW-CMM, the SEI and community have put in place an effective means for modeling, defining, and measuring the maturity of the processes used by software professionals."

Companies are forced to seek out process improvements as a result of an uncontrolled, unenforceable software development life cycle. These companies are doing so to reduce the significant time, money, and energy currently wasted in chaotic development projects.

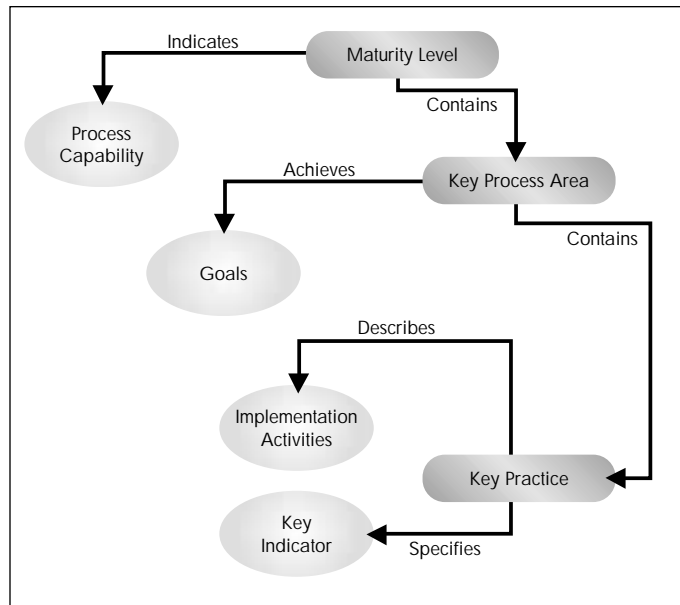
Adding to the complexities are rapidly changing development environments and the associated learning curve for employees. Even if a company has experienced staff members, a lot of their time is spent training new staff or correcting errors caused by inadequately trained employees. All of this occurring during the most critical time in a project: the kickoff.

SEI experts have consistently found that the solution lies in managing software as a repeatable, controlled process rather than an ad hoc, chaotic environment. It has been found that:

- Processes should be standardized and repeatable.
- Training should communicate these processes.
- Metrics should be gathered to allow repeatable processes to be predicted.
- Deviations from past performance should be identified and analyzed.
- Processes should improve with time as more is learned.

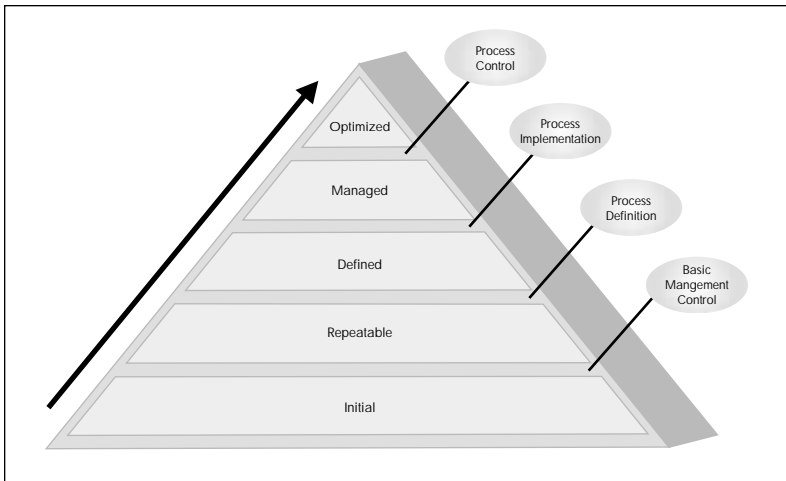
Software process measurement models look at an organization in terms of its software development maturity.

As shown in figure 1, this maturity is a strong indicator of the organization's software process capability. A maturity level consists of key skill sets, called key process areas. These key process areas are the means by which an organization is successful in achieving its goals. Each key process area contains key practices. The key practices are how the organizational wisdom is instilled. In addition, these key practices specify key indicators that may be monitored to measure effectiveness. These key indicators then form the basis for a true statistical-based Total Quality Management (TQM) approach to building software.



**Figure 1: A mature software process streamlines development and delivers predictable, repeatable quality.**

Figure 2 illustrates what is undoubtedly the most well-known software process development model, the *Software Engineering Institute's Capability Maturity Model (CMM)*.



| **Figure 2: Five levels of the Capability Maturity Model (CMM)**

At the bottom of this model an organization starts out in an initial state. Projects succeed or fail based on the capabilities of the individual members of the project team. Organizations in this state may be successful but it is often dependent on a few highly skilled and knowledgeable employees. The results become more and more unpredictable as organizations add new employees and new applications to the mix.

The SEI states that the Capability Maturity Model for Software describes the principles and practices underlying software process maturity and is intended to help software organizations improve the maturity of their software processes in terms of an evolutionary

path from ad hoc, chaotic processes to mature, disciplined software processes. The CMM is organized into five maturity levels:

- 1) *Initial* — The software process is characterized as ad hoc, and occasionally even chaotic. Few processes are defined, and success depends on individual effort and heroics.
- 2) *Repeatable* — Basic project management processes are established to track cost, schedule, and functionality. The necessary process discipline is in place to repeat earlier successes on projects with similar applications.
- 3) *Defined* — The software process for both management and engineering activities is documented, standardized, and integrated into a standard software process for the organization. All projects use an approved, tailored version of the organization's standard software process for developing and maintaining software.
- 4) *Managed* — Detailed measures of the software process and product quality are collected. Both the software process and products are quantitatively understood and controlled.
- 5) *Optimized* — Continuous process improvement is enabled by quantifiable feedback from the process and from piloting innovative ideas and technologies.

An organization's control, predictability, and effectiveness of their software development processes are believed to improve as it moves up through the five levels.

Take for example the information below from a major automotive manufacturer and the SEI:

*"Having looked briefly at the definition and potential benefits of the Capability Maturity Model, it is reasonable to ask whether those benefits have been realized. If so, can they be quantified?"*

The following table, Figure 3, shows the estimated average benefits from a study conducted by the Software Engineering Institute. The study quantified productivity, quality, and cost results for projects and organizations by CMM maturity level.

The results represent measured benefits that are attainable at each level.

Maturity Level	Calendar Months	Effort (Work Mos.)	Defects Found	Defects Shipped	Total Cost
1	29.8	593.5	1,348	61	\$5,440,000
2	18.5	143.0	328	12	\$1,311,000
3	15.2	79.5	182	7	\$728,000
4	12.5	42.8	97	5	\$392,000
5	9.0	16.0	37	1	\$146,000

**Figure 3: Estimated average benefits attainable at each CMM maturity level.**

*"The benefits of reaching higher maturity levels are dramatic. A maturity increase from Level 1 to Level 2 delivers a 38% reduction in time to deliver; a 76% reduction in effort, in defects found during development, and in total costs; and an 80% reduction in defects shipped."*

Except for Level 1, each maturity level is broken down into several key process areas that indicate the areas an organization should focus on to improve its software process.

The key process areas for Level 2 focus on the software project's concerns related to establishing basic project management controls. They are:

- Software Configuration Management
- Software Quality Assurance
- Software Subcontract Management
- Requirements Management
- Software Project Planning
- Software Project Tracking and Oversight

Level 3 key process areas address both project and organizational issues, as the organization establishes an infrastructure that supports effective software engineering and management processes across all projects. They are:

- Organization Process Focus
- Organization Process Definition
- Training Program
- Integrated Software Management
- Software Product Engineering
- Inter-Group Coordination
- Peer Reviews

The key process areas for Level 4 focus on establishing a measurable understanding of both the software process and the software products being developed.

They are:

- Quantitative Process Management
- Software Quality Management

The key process areas at Level 5 cover the issues that both the organization and the projects must address to implement ongoing, measurable software process improvement. They are:

- Defect Prevention
- Technology Change Management
- Process Change Management

Each key process area is described in terms of the key practices that contribute to satisfying its goals. The key practices describe the infrastructure and activities that contribute most to the effective implementation and institutionalization of the key process area.

By introducing basic management controls (tracking cost, schedule, and completion status) an organization is able to transition to a repeatable process. Because the organization's wisdom is primarily resident in the minds of the employees, it is still difficult to bring on new staff. Significant disruption and turnover can also create major problems. There are six primary areas organizations need to focus on to institutionalize basic management controls:

- Software configuration management
- Software quality assurance
- Software subcontract management
- Requirements management
- Software project planning
- Software project tracking and oversight

The next step in organizational maturity is the transition from level 2 (repeatable) to level 3 (defined). This requires a formal approach to process definition that institutes organizational best practices and ensures consistent, repeatable performance.

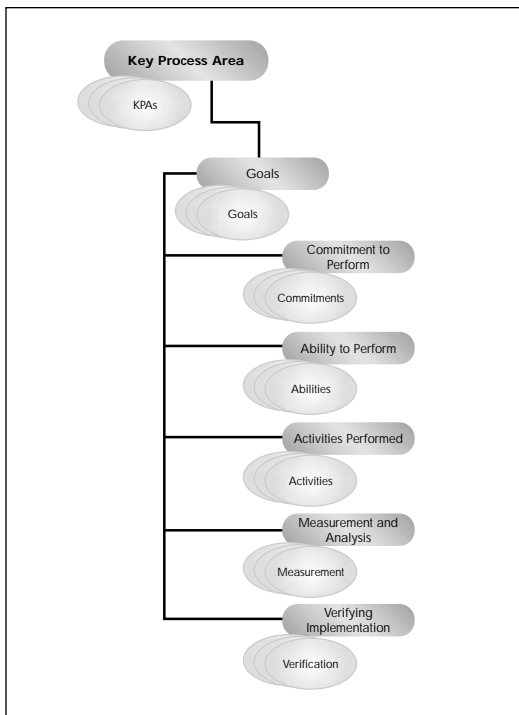
As organizational processes grow and mature to level 4, the process of understanding and measuring the instituted practices becomes an indicator of software quality.

Finally, graduation to the very elite status of an optimizing (level 5) organization can be achieved through implementation of process change management, on-going management of technology innovation, and defect prevention activities.

# SOFTWARE CONFIGURATION MANAGEMENT

As noted before, the key process areas at Level 2 focus on the software project's concerns related to establishing basic project management controls. They are Software Configuration Management, Software Quality Assurance, Software Subcontract Management, Requirements Management, Software Project Planning, and Software Project Tracking and Oversight.

The CMM provides a hierarchical structure allowing a very granular level against which to review the ability of Serena ChangeMan ZMF, Serena Software's comprehensive Software Change Management solution for MVS environment, to support CMM Level 2 compliance, as illustrated in Figure 4.



**Figure 4: Serena ChangeMan ZMF provides robust features that support the demands attaining CMM Level 2 compliance.**

It should come as no surprise that there is no single tool that will satisfy all of the key practices and process requirements of the CMM. However, a quality tool such as Serena ChangeMan ZMF can have a dramatic affect on the amount of effort required to implement and maintain an effective Software Configuration Management (SCM) process.

Although this report addresses the CMM at a granular level it is important to know the goals and to understand that all of the detailed tasks are geared towards achieving the following goals:

*Goal 1:* Software configuration management activities are planned.

*Goal 2:* Selected software work products are identified, controlled, and available.

*Goal 3:* Changes to identified software work products are controlled.

*Goal 4:* Affected groups and individuals are informed of the status and content of software baselines.

# KEY PRACTICES

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Throughout this report there are references to both a Software Configuration Control Board (SCCB) and a Change Control Review Board (CCRB). The SCCB is introduced via the CMM and the CCRB is introduced via Serena Software's Best

Practices. Serena Software feels the role of the SCCB is too limiting and therefore chose to continue to use the term CCRB; however, to ensure accuracy with the CMM, references to the SCCB remain intact in the following Key Practices.

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## Commitment to Perform

### **Commitment 1**

*The project follows a written organizational policy for implementing Software Configuration Management (SCM).*

This policy typically specifies that:

- 1) Responsibility for SCM for each project is explicitly assigned
- 2) SCM is implemented throughout the project's life cycle
- 3) SCM is implemented for externally deliverable software products, designated internal software work products, and designated support tools used inside the project (e.g., compilers)
- 4) Projects establish or have access to a repository for storing configuration items/units and the associated SCM records
- 5) Software baselines and SCM activities are audited on a periodic basis

### **Serena ChangeMan Support for Commitment 1**

Although Serena ChangeMan ZMF does not necessarily provide a means to document a process, it does provide a facility to enforce the policies described in the SCM Policy.

Through the use of security and Serena ChangeMan ZMF application definitions, responsibility can be assigned for changes. Going one step further, through the use of its Approvals a high level of accountability is also gained.

The Serena ChangeMan ZMF life cycle is automated. Therefore, what is documented as the process and is configured within is an automated, repeatable process that cannot be maliciously surpassed.

Vended applications, as well as internal applications can all be placed under the control of Serena ChangeMan ZMF. It is a general practice for well managed companies to execute Serena ChangeMan ZMF customizations under its own control.

Changes within Serena ChangeMan ZMF are traceable and auditable at all times via Reports, Audit Results, and Impact Analysis data.

Support for Serena auditing of baseline libraries is inherent in Serena ChangeMan ZMF.

Reports can be run and the change history reviewed to determine what has happened, when it happened, who executed the change, and who approved the change.

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## Ability to Perform

### Ability 1

*A group having the authority for managing the project's software baselines (that is a Software Configuration Control Board - SCCB) exists or is established.*

The SCCB:

- 1) Authorizes the establishment of software baselines and the identification of configuration items/units
- 2) Represents the interests of the project manager and all groups who may be affected by changes to the software baselines
- 3) Reviews and authorizes changes to the software baselines
- 4) Authorizes the creation of products from the software baseline library

### Serena ChangeMan Support for Ability 1

Despite the fact that Serena ChangeMan ZMF is the best-of-breed SCM tool in the industry, it cannot convene meetings nor provide a control point for a board's responsibility. However, it is a key tool that should be used to formalize and enforce the decisions made by the SCCB/CCRB.

The SCCB/CCRB must be an integral part of the creation of any SCM process. There are always trade-offs and technical standards that need to be decided. These decisions are then implemented as standard processes within the application.

Once changes are moving through Serena ChangeMan ZMF, the SCCB/CCRB manages change across the organization. It then reports on Impact Analysis and Change Scheduling.

It also supports the efforts of the SCCB/CCRB by providing an unwavering point of control for defining software baselines and enforcing a defined application development life cycle, including build and release management.

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## Ability 2

*A group that is responsible for coordinating and implementing SCM for the project (that is the SCM group) exists.*

The SCM group coordinates or implements:

- 1) Creation and management of the project's software baseline library
- 2) Development, maintenance, and distribution of the SCM plans, standards, and procedures
- 3) Identification of the set of work products to be placed under SCM
- 4) Management of the access to the software baseline library
- 5) Updates of the software baselines
- 6) Creation of products from the software baseline library
- 7) Recording of SCM actions
- 8) Production and distribution of SCM reports

### **Serena ChangeMan Support for Ability 2**

The SEI standard says that an effective Software Configuration Management team needs to exist and control the SCM process and procedures. Serena Software agrees 100% with this guideline. There should be a defined group that manages the corporate SCM activities at the direction of the SCCB/CCRB. The SCM team becomes the global

administrators for change across the company. These Global Administrators are responsible for the Change Tools, the Production Libraries, and implementing the standards set by the SCCB/CCRB.

Serena ChangeMan ZMF provides complete support for this type of Global Administration.

If a company chooses to, they can also distribute some level of control to Local Administrators. Local Administrators are limited to authorized functions and cannot set change standards to less than that set by the Global Administrators. With this level of control, and working in conjunction with an organization's existing security package, it allows customers to define and report on change activities that are both Global and Application-specific in nature.

The core SCM team is also responsible for Serena ChangeMan ZMF databases that control the definition and change of all components.

All changes to software and to the system are logged in the Activity Trail database.

The core SCM team is also responsible for identification and publication of standard or custom change reports that are required by the SCCB/CCRB and the development teams.

The SCM team may choose to use the standard reports provided, or since the source is provided, they may choose to customize the reports to meet local reporting requirements.

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### Ability 3

*Adequate resources and funding are provided to perform the SCM activities.*

1. A manager is assigned specific responsibilities for SCM.
2. Tools to support the SCM activities are made available.

### **Serena ChangeMan Support for Ability 3**

Ability 2 confirms the need for a Global SCM team, complete with a manager who is responsible for the company's SCM activities.

While Serena Software does not appoint a manager, its consultants will work with an organization's existing manager and management staff to strengthen the abilities of the staff to manage a changing environment. Serena consultants provide detailed project management and training on how to implement SCM Best Practices.

Serena consultants are specifically chosen for the experience they bring when implementing successful SCM solutions. They have the expertise and knowledge to know what to worry about and what to ignore, the pragmatism necessary to help make hard engineering decisions, and the ability to deliver on time and within budget.

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### Ability 4

*Members of the SCM group are trained in the objectives, procedures, and methods for performing their SCM activities.*

Examples of training include:

- SCM standards, procedures, and methods
- SCM tools

### **Serena ChangeMan Support for Ability 4**

One of the unique attributes of Serena ChangeMan ZMF is that based on industry-accepted SCM Best Practices, it surpasses the SCM tool expectations of the CMM and provides customers the ability to define, implement, and enforce customer-specified SCM standards, procedures and methods.

Defining the process can be a collaborative effort between a customer and Serena Software or it can be a pre-existing process. In either case, customizations to Serena ChangeMan ZMF are conducted through the use of ISPF Dialog Management changes, Application Program Interfaces, Exits, and integrating existing tools within its automated flow.

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## Ability 5

*Members of the software engineering group and other software-related groups are trained to perform their SCM activities.*

Examples of training include:

- The standards, procedures, and methods to be followed for SCM activities performed inside the software engineering group and other software-related groups
- The role, responsibilities, and authority of the SCM group

### **Serena ChangeMan Support for Ability 5**

Serena ChangeMan ZMF is an SCM tool; it cannot perform all of the requirements of the CMM. It is important to note that process improvements,

as well as services from outside vendors, can help achieve the CMM's goals. In this case, Serena Software is the vendor of choice when it comes to education. The critical aspect of CMM is that customers have an active, ongoing education program that includes both internal processes and tool usage.

When needed, fully trained consultants are available. Serena consultants can be used as temporary support during periods of employee transition, or times of high change volume.

Serena Software provides both ongoing education at its corporate headquarters in San Mateo, California, as well as on-site training at a customer's location.

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## Activities Performed

### **Activity 1**

*An SCM plan is prepared for each software project according to a documented procedure.*

This procedure typically specifies that:

1. The SCM plan is developed in the early stages of, and in parallel with, the overall project planning.
2. The affected groups review the SCM plan.
3. The SCM plan is managed and controlled.

### **Serena ChangeMan Support for Activity 1**

When the application is migrated into Serena ChangeMan ZMF, an SCM software plan is created by the Administrator and the software development staff. It lists which components will be managed and how.

This plan is then used to create the Application that defines and controls the libraries, and the processing allowed. As the tool that enforces key components of the plan, it can be easily customized to enforce the modified SCM plan.

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## Activity 2

*A documented and approved SCM plan is used as the basis for performing the SCM activities.*

The plan covers:

1. The SCM activities to be performed, the schedule of activities, the assigned responsibilities, and the resources required
2. The SCM requirements and activities to be performed by the software engineering group and other software-related groups

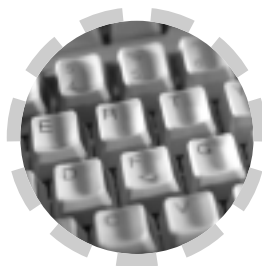
## Serena ChangeMan Support for Activity 2

As part of the SCM plan there will undoubtedly be requirements for SCM activities for software engineering groups. Change Man provides typical, yet critical tasks to support effective SCM.

The most common requirements are:

- *Impact Analysis* — Ability to assess the ramifications of a change before it hits production
- *Version Control* — Facility to manage any number of component versions
- *Library Management* — A non-proprietary means of storing data with the ability to define various levels of SCM and the ability to rapidly access the data stored in the libraries

- *Audit Trails* — Capability to determine what has changed, when it changed, who changed it, and who approved the change for promotion
- *Online Approvals* — The availability of a fast and secure approval process — in parallel, serial, or both processes of approving changes
- *Concurrent Development Relief* — Support for multiple development versions of changes and the ability to eliminate overlays and cultivate developer communications
- *Freeze Control* — Ensure that the changes tested are the ones put into production
- *Automated Backout* — Ability to revert to earlier code in seconds
- *Checkout* — Guarantee developers are working with the right version every time
- *Emergency Protocols* — Protect the integrity of the quick fix
- *Online Forms* — Reduce paperwork and keep the process moving
- *Managed Processes* — Able to automatically control and track all component translation processes
- *Security* — Protect data in concert with the security system



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### Activity 3

*A configuration management library system is established as a repository for the software baselines.*

This library system:

1. Supports multiple control levels of SCM
2. Provides for the storage and retrieval of configuration items/units
3. Allows for the sharing and transfer of configuration items/units between the affected groups and between control levels within the library
4. Helps in the use of product standards for configuration items/units
5. Provides for the storage and recovery of archive versions of configuration items/units
6. Helps to ensure correct creation of products from the software baseline library
7. Provides for the storage, update, and retrieval of SCM records
8. Supports production of SCM reports
9. Provides for the maintenance of the library structure and contents

### Serena ChangeMan Support for Activity 3

Serena ChangeMan ZMF supports both IBM PDS and PDS/E library structures. Additionally, it has the ability to interface with many common proprietary file/storage systems (including Computer Associates CA-Panvalet and CA-Librarian).

Through the use of staging and promotion libraries, it provides a structured means of segregating SCM environments. Because it is in control of SCM libraries there is a high level of confidence in the creation and maintenance of its libraries.

Serena ChangeMan ZMF allows customers to choose between Assembler or SAS reports to support research and audit of development, testing, and production libraries.



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## Activity 4

*The software work products to be placed under configuration management are identified.*

This process includes the following steps:

1. The configuration items/units are selected based on documented criteria.
2. The configuration items/units are assigned unique identifiers.
3. The characteristics of each configuration item/unit are specified.
4. The software baselines to which each configuration item/unit belongs are specified.
5. The point in its development that each configuration item/unit is placed under configuration management is specified.
6. The person responsible for each configuration item/unit (i.e., the owner, from a configuration management point of view) is identified.

## Serena ChangeMan Support for Activity 4

All configuration items (components in Serena ChangeMan ZMF terminology) are defined in the Package Master. Component name and component type uniquely define all components. The Package Master contains a record of all changes to a component and characteristic of each item, and information on translation process options.

All libraries managed by Serena ChangeMan ZMF are assigned to an Application and that application should have a defined owner and support team defined. All change packages are created as part of the Application where the responsible teams have control.

Serena ChangeMan ZMF uses Change Packages to deliver unparalleled efficiency and management control. It groups all components of a change together at the beginning, protecting the integrity of the entire change throughout the software life cycle. A change package may contain up to thousands of components, and developers can act on entire groups of components with a single package command.

With each unique Change Package:

- Source-to-load integrity is locked down early
- All activities performed on a change package are captured and tracked online
- Component impact is consistently reported
- Versions are linked throughout the life cycle
- Developers no longer have to remember which components need to migrate together

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## Activity 5

*Change requests and problem reports for all configuration items/units are initiated, recorded, reviewed, approved, and tracked according to a documented procedure.*

## Serena ChangeMan Support for Activity 5

With change packages, all components of a change are modified together, approved together, installed together, even backed out together.

The documented SCM plan comes to life as the developers use the SCM policies and Serena ChangeMan ZMF to manage the SCM process.

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## Activity 6

*Changes to baselines are controlled according to a documented procedure.*

This procedure typically specifies that:

1. Reviews and/or regression tests are performed to ensure that changes have not caused unintended effects on the baseline
2. Only configuration items/units that are approved by the SCCB/CCRB are entered into the software baseline library
3. Configuration items/units are checked in and out in a manner that maintains the correctness and integrity of the software baseline library

## Serena ChangeMan Support for Activity 6

Change Man Impact Analysis, Audit, Approval, and simple Check-in features speak directly to this activity.

These features are available immediately after installation. With a minimal amount of customization companies can rapidly improve their level of control over software development.



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## Activity 7

*Products from the software baseline library are created and their release is controlled according to a documented procedure.*

This procedure typically specifies that:

1. The SCCB/CCRB authorizes the creation of products from the software baseline library.
2. Products from the software baseline library, for both internal and external use, are built only from configuration items/units in the software baseline library.

## Serena ChangeMan Support for Activity 7

Serena ChangeMan ZMF controls every code change and ensures that only successfully-tested programs make it into production. It reduces maintenance costs and regression errors by moving code through an automated life cycle with strict accountability and quality assurances at every step, including the transform or build process.

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## Activity 8

*The status of configuration items/units is recorded according to a documented procedure.*

This procedure typically specifies that:

1. The configuration management actions are recorded in sufficient detail so that the content and status of each configuration item/unit are known and previous versions can be recovered.
2. The current status and history (i.e., changes and other actions) of each configuration item/unit are maintained.

## Serena ChangeMan Support for Activity 8

Serena ChangeMan ZMF provides the status of each and every change at all times through a simple user interface. A history of changes is also maintained, including the ability to view transform options used during the build process.

Serena ChangeMan ZMF allows the SCCB/CCRB to determine how many versions of components should be maintained. It will store up to 999 versions of components.

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## Activity 9

*Standard reports documenting the SCM activities and the contents of the software baseline are developed and made available to affected groups and individuals.*

Examples of reports include:

- Summary of changes made to the software baselines
- Revision history of configuration items/units
- Software baseline status
- Results of software baseline audits

## Serena ChangeMan Support for Activity 9

Serena ChangeMan ZMF provides a set of reports that can be used in conjunction with the printable information displayed on query screens. This includes scheduled changes, change status, history and audit results.

These reports are not limited to software coding changes and change packages. There are several administrative reports that can be used to help monitor and maintain changes to Application definitions.

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## Activity 10

*Software baseline audits are conducted according to a documented procedure.*

This procedure typically specifies that:

1. There is adequate preparation for the audit
2. The integrity of software baselines is assessed
3. The structure and facilities of the configuration management library system are reviewed
4. The completeness and correctness of the software baseline library contents are verified
5. Compliance with applicable SCM standards and procedures is verified
6. The results of the audit are reported to the project software manager
7. Action items from the audit are tracked to closure

## Serena ChangeMan Support for Activity 10

One of the strongest features within Serena ChangeMan ZMF is the Audit function. The Audit function is critical to maintaining the integrity of baseline libraries thereby enforcing SCM processes defined by the organization. The results of the audit are available for printing to support further investigation or enforcement.

When it is time for an internal or external Audit, Serena ChangeMan ZMF contains all of the information an auditor might need. The only information that is not contained is security access to baseline libraries. That information is contained within the local security system (such as RACF).

# Measurement and Analysis

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## Measurement 1

*Measurements are made and used to determine the status of the SCM activities.*

Examples of measurements include:

- Number of change requests processed per unit time
- Completions of milestones for the SCM activities compared to the plan
- Work completed, effort expended, and funds expended in the SCM activities



## Serena ChangeMan Support for Measurement 1

Serena ChangeMan ZMF scheduler information can be used to support measurement requirements by both project managers and the SCCB/CCRB.

There are milestones in Serena ChangeMan ZMF that can be used to effectively manage the software change lifecycle. Milestones such as all components have been changed (Active), component changes have been completed (Freeze), components are ready for System Test (Promote), and that changes are in ready for associated groups review (Approval).

As change packages move through the software product life cycle the projects they support can be tracked and managed.

# Verifying Implementation

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## Verification 1

*The SCM activities are reviewed with senior management on a periodic basis.*

The primary purpose of periodic reviews by senior management is to provide timely awareness of and insight into software process activities. The time between reviews should meet the needs of the organization and may be lengthy, as long as adequate mechanisms for exception reporting are available.

## Serena ChangeMan Support for Verification 1

Once all changes are migrated to Serena ChangeMan ZMF organizations will have a defined repeatable process that can be reviewed and audited.

These reviews by management and auditors should review conformance to standards and process enhancements. These reviews are key to CMM and to Continuous Process Improvement.

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## Verification 2

*The SCM activities are reviewed with the project manager on both a periodic and event-driven basis.*

## Serena ChangeMan Support for Verification 2

Information about changes and the results of transforms and testing are readily available to team leaders and project managers to support this ongoing review process. Any authorized member of the team familiar with either TSO/ISPF, or has an appropriate Web browser, can access this information.

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## Verification 3

*The SCM group periodically audits software baselines to verify that they conform to the documentation that defines them.*

## Serena ChangeMan Support for Verification 3

Our experience in dealing with companies of all sizes confirms that organizations with formal Change Management groups are more successful in defining and controlling change within their environments.

Their role as self-auditors is greatly enhanced by using Serena ChangeMan ZMF to confirm that the defined processes are indeed being conformed to. An example of this is the ability to determine the number of emergency changes and whether this type of change is being abused simply to avoid a more structured review and approval process.



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## Verification 4

*The software quality assurance group reviews and/or audits the activities and work products for SCM and reports the results.*

At a minimum, the reviews and/or audits verify compliance with the SCM standards and procedures by the:

1. SCM group
2. SCCB/CCRB
3. Software engineering group
4. Other software-related groups

## Serena ChangeMan Support for Verification 4

It not only helps enforce a quality assurance process, but because changes to itself are conducted using Serena ChangeMan ZMF the results of such customizations or updates can also progress through the normal life cycle. It is thus easy to verify the conformance to established standards by reviewing information about changes within Serena ChangeMan ZMF.

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# SOFTWARE QUALITY ASSURANCE

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## Level 2 Software Quality Assurance Goals

- Goal 1: Software quality assurance activities are planned.
- Goal 2: Adherence of software products and activities to the applicable standards, procedures, and requirements is verified objectively.
- Goal 3: Affected groups and individuals are informed of software quality assurance activities and results.
- Goal 4: Noncompliance issues that cannot be resolved within the software project are addressed by senior management.

## Serena ChangeMan ZMF Support for Software Quality Assurance

Serena ChangeMan ZMF provides support for maintaining the quality and integrity of software development. This is achieved by enforcing documented procedures, processes, and requirements via a highly-flexible combination of ISPF panels and skeletons, the use of exits, and administrative options. An objective verification is paramount since the task of enforcement is synonymous with verification.

All activities and results affecting a component or group of components can be made available for review and selectively communicated to staff, including nonconformance violations to senior management. This can be done using interfaces to MVS Send and/or SMTP to e-mail applications.

# SOFTWARE SUBCONTRACT MANAGEMENT

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## Software Subcontract Management Goals

- Goal 1: Prime contractor selects qualified software subcontractors.
- Goal 2: Prime contractor and the software subcontractor agree to their commitments to each other.
- Goal 3: Prime contractor and the software subcontractor maintain ongoing communications.
- Goal 4: Prime contractor tracks the software subcontractor's actual results and performance against its commitments.

## Serena ChangeMan Support for Software Subcontract Management

Subcontract management support from Serena ChangeMan ZMF comes in the form of supporting documentation maintained about the history and progress of changes across the mainframe enterprise.



# REQUIREMENTS MANAGEMENT

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## Requirements Management Goals

- Goal 1: System requirements allocated to software are controlled to establish a baseline for software engineering and management use.
- Goal 2: Software plans, products, and activities are kept consistent with the system requirements allocated to software.

## Serena ChangeMan Support for Requirements Management

A critical phase in determining the requirements for software changes is the ability to accurately estimate the impact and scope of the change. In turn, the information gathered via the Serena ChangeMan ZMF Impact Analysis can be used to support estimating and planning the software project. Consistency is tracked internally via monitoring the project's activities and progress.

# SOFTWARE PROJECT PLANNING

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## **Software Project Planning Goals**

- Goal 1: Software estimates are documented for use in planning and tracking the software project.
- Goal 2: Software project activities and commitments are planned and documented.
- Goal 3: Affected groups and individuals agree to their commitments related to the software project.

## **Serena ChangeMan ZMF Support for Software Project Planning**

Furthering the requirements management process is the act of managing the project planning process. Following a statement of work, the project planning phase will draw information from the software component relationship information to measure the size of the project as well as help determine the resources and time needed.

# SOFTWARE PROJECT TRACKING AND OVERSIGHT

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## **Software Project Tracking and Oversight Goals**

- Goal 1: Actual results and performance are tracked against the software plans.
- Goal 2: Corrective actions are taken and managed to closure when actual results and performance deviate significantly from the software plans.
- Goal 3: Changes to software commitments are agreed to by the affected groups and individuals.

## **Serena ChangeMan ZMF Support for Software Project Tracking and Oversight**

Team Leaders and Managers can monitor the progress and status of projects within Serena ChangeMan ZMF by their respective areas of application responsibility. In turn, this information can be used to measure performance against project plans as well as identify deviations. These same managers can view actual build and test results to ensure that the actual changes that were committed to have been delivered.

# CONCLUSION

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Adhering to the principles set forth by the Software Engineering Institute in their Software Capability Maturity Model affords IT organizations a significant advantage in increasing application quality and availability. By detailing the steps required to introduce advanced capabilities into an organization's development process, the SEI has provided a valuable guideline for IT management to follow.

Serena Software supports and encourages adoption of the practices defined in the Capability Maturity Model. The procedures advocated by the SEI for CMM Level 2 compliance closely mirror those defined in Serena Best Practices, and can lead to significant improvement in IT infrastructure efficiency. Serena Software agrees with the SEI

and other analyst firms that in establishing an efficient development environment, the rule is process first, tool second.

Serena Software specializes in helping companies automate the software life cycle to accelerate development and improve software reliability. Serena ChangeMan ZMF directly supports many of the specific requirements defined in the SEI CMM Level 2, and automates key portions of development activity to ensure repeatable software quality. While no single tool can ensure CMM Level 2 compliance, Serena ChangeMan ZMF provides essential automation, audit trails and configuration management controls required to support the granular requirements of Level 2 compliance. A Serena ChangeMan ZMF implementation founded on Serena Best Practices can have a dramatic effect on an organization's ability to deliver consistent, repeatable software quality.

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## About Serena Software

Serena software is an industry leading provider of software infrastructure products and consulting Best Practices that automate application changes from the enterprise to the Web.

Serena Software maintains a global presence with headquarters in San Mateo, California,

international offices in the United Kingdom, Germany, France, Benelux region and Canada, and international distributors for local support and service. Serena Software can be reached at [www.serena.com](http://www.serena.com)

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