The Benefits of Software Configuration Management

WHITE PAPER

Abstract

This white paper presents the fundamental concepts of software configuration management (SCM), its benefits for developers and the return on investment (ROI) for the business. In addition to the basic SCM practices of version control, revision management and change processes, we will discuss the allied tasks of managing change in corporate website publishing and content management. Using examples and typical customer questions, we will explore why you need to organize, manage and protect digital assets during team development, and why code and content need to be managed together for maximum efficiency of SCM in the e-business enterprise.

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Enterprise Development—Getting Tougher All the Time

Enterprises have to change more rapidly than ever, in order to attract and keep customers, as well as to streamline operations and reduce costs of doing business. Typically, the ability to change fast is enabled — even encouraged — by technology. Most likely to experience ongoing change are the application code and web content driving e-business, as well as the software needed to run day-to-day operations.

In addition to this constant change, there is an exponential increase in complexity driven in large part by the Internet. The Web platform involves more and greater diversity of digital assets; faster rates of change; and higher user expectations for timeliness and functionality. While the Web and its immediacy offer huge advantages for business, it is also a real challenge to manage the complexity and retain control, while maximizing access to applications and data.

You need proven, repeatable, processes for implementing change with less risk, and the technologies to enable it.

Ultimately, change management leads to greater business agility — your teams are freed from wasted time, duplicative efforts, administrative overhead and defect-riddled software. Your business is freed from costly rework, wasted developer time and customer dissatisfaction.

When you have a system for managing enterprise change, you can confidently answer—

- When software will be ready to ship
- What functionality it delivers
- Which fixes have been made
- Who approved your web content
- How the new release was built

"Companies need a development process that embraces change—not one that resists it." — Harvard Business Review

Taking Charge

Do you cringe at the words "this code needs a few more changes," or "this document must be on the Web by 5:00 p.m.?" Do you wish you could stop the clock long enough to catch up? Then we don't have to tell you about the pressure you are under to create, maintain and update business applications and web content. You already know it. You want to know how to achieve it. MERANT can help, by providing the tools and processes that:

- Protect software assets from unwanted changes with automated version control
- Automate repetitive, non-creative development tasks
- Establish checkpoints, approvals and processes, and enforce them automatically

- Automate the process of capturing, tracking and managing change requests and team development issues that affect project timelines and software quality.

"In the future, the only sustainable competitive advantage will be your ability to change more rapidly than your competition."

— The Gartner Group

Making Change Manageable

Most enterprises need to manage change in three key areas: custom developed corporate software; packaged application suites and related customizations; and the Web.

In many cases, it is advantageous to manage them all together — application code, web content and digital assets — hence the umbrella term of "Enterprise Change Management" or ECM.

The changes generated in any of these areas of development invariable ripple through the entire organization. Change can be made manageable with integrated systems for software configuration management (SCM) which can include packaged application change management, and web content management (WCM).

Software Configuration Management (SCM)

SCM enhances productivity and boosts application quality because it automatically versions files, labels and organizes them as they change during the development process. SCM prevents unintentional code overwrites, which can result in missed bug fixes or customer-specific change requests. The impact of even a few defects or missed changes can seriously overburden support or bring a mission-critical application to a halt. With SCM, you can stop trouble before it starts.

SCM also enables parallel development. You don't have to wait for one team or developer to finish a task before others can proceed. Instead of developing sequentially, you develop concurrently—because it's safe and easy to do so. Timelines become more predictable when you don't have to wait for sequential development. You get to market faster. With fewer errors.

Packaged applications

SCM may also include specialized change management for packaged application suites (Oracle Applications for enterprise resource planning, for example). It should enable you to organize and protect the many interrelated forms, libraries and environments of packaged applications, so that it is easier to identify what has changed, where the change occurs, and what the impact the change may have on other components of the suite. As a result, patches, upgrades and new releases — as well as business-critical customizations of your own — can be implemented quickly, without time consuming re-coding.

Web Content Management (WCM)

A critical new facet of enterprise change management has emerged: the need to keep track of ongoing modification to websites and web content, including the ability to accept, organize and publish contributions across the enterprise,

regardless of the technical expertise of the provider. Thanks to the Internet, virtually everyone in a company can be a part of the 'development team,' and any IT asset can be incorporated as "content."

Thus, robust yet flexible WCM is crucial for keeping all the moving parts in synch, while assuring that web applications, content and data are accurate, functional and up to date.

In one sense, WCM is merely SCM taken to a new level for a new technical need. Certainly some of the same disciplines of version control and release management are there, along with process control in the form of checks and approvals before new content is published, and baseline management in the form of protected page designs and templates.

However, most experts agree that WCM is becoming increasingly specialized and complex, calling for a new set of tools and processes to ensure quality, timeliness and business efficiency.

The Benefits Cascade throughout Your Company

The concept of yet another technology to "manage" what people do may conjure up images of "more work, less creativity." But once you begin to manage change well with SCM, your project leaders, developers and business executives will actually breath a sigh of relief.

That's because SCM doesn't have to mean yet another breed of technologies, layered over many others, with yet another set of protocols and commands to learn. Good SCM shouldn't add work, it reduces it. SCM enables you to quickly make changes to software, web content and packaged applications. It supports the implementation of changes, from emergence to resolution. It enables you to develop higher quality applications and effective websites, faster.

"The MERANT solution for managing changes in Oracle Applications allows us to concentrate on bringing new capabilities to market faster. We don't get stuck re-coding our customizations with every patch or upgrade the vendor releases."

— Stephen Schmitz, IT Director, Carlson Companies Marketing Group

Benefits for project leaders

When you automate the hand-offs related to changes, you achieve faster code turnover, shorter development cycles, easier adaptability to market changes and better use of an individual developer's special skills. You are able to:

- Account for and report the progress of development efforts
- Prevent unauthorized access to assets
- Coordinate, track and manage change activities

Benefits for developers

Developers have concerns that are different from those of management. Managing change prevents these common day-to-day aggravations that developers face in ad hoc team development:

- What happened to this piece of code? It worked yesterday!
- Why isn't that graphic on the website yet?
- I thought there was a bug in this code, but now I can't reproduce it.
- What happened to the fix I added to this code last week?
- Did the right changes go into the release?
- What issues have been assigned to me for resolution?

Benefits for business managers

Executive management will see benefits for the business bottom line:

- Ability to deliver revisions, updates and cross-platform versions, faster
- Improved customer satisfaction
- Less time wasted fixing old code
- Confidence that web content is correct and the site is stable
- Higher productivity of a valuable resource—talented developers
- Confidence that each release addresses all the requested changes

Basic Concepts and Definitions for SCM

The following are some basic concepts and terminologies used in software configuration management:

Revision management

This is the core function of SCM and the foundation upon which other functions build. Revision management is the storage of multiple "images" of the development files in an application, which can be shared by multiple developers. With revision management, you can get an "image"—a snapshot in time of the development process—and can re-create any file to the way it was at any point in time.

Version management

While revision management shows development *files* in progress, a version is a particular instance of an entire development project. A version is usually thought of as all the functions, features and complete builds you can use right now. Files managed, version-labeled and promoted by the revision management system are used to build the version.

Workflow and process management

As software or web content is developed, it is said to go through a "lifecycle." Whether formal or informal, there are usually milestones in this lifecycle, such as DEVELOPMENT-TEST-ALPHA-BETA-RELEASE for applications, TEST and PRODUCTION for packaged applications or, for websites, staging

servers, review checkpoints and approvals before content is posted. A good SCM solution must manage the progress of code and content through the lifecycle. This is many levels above the simple source code protection built into some development platforms.

Build management

When the code files, compilers, development tools and other components needed to create an application are ready, developers make an application "build." Build management imposes automated, repeatable procedures that speed the build process, improve build accuracy and make it easier to create and maintain multiple versions of an application. An SCM toolset can become a vital integrative resource for building an application across multiple platforms. A strong cross-platform build management capability also eliminates the need to redefine the build process (the script) for each platform you are targeting.

Change requests

The days of creating software, shrink-wrapping it, selling it and walking away are long gone. Today's software undergoes a constant process of revision. Development teams can be overwhelmed with the many software change requests (SCRs) and web change requests (WCRs) they receive, everything from users' wish lists, to new business requirements that must be accommodated, to bona fide bug reports.

SCM enables teams to streamline the SCR/WCR process by automatically tracking updates, change requests, problems and issues; assigning ownership and hand-offs within the development team; and communicating the process through to resolution.

Code and project auditing

Cross-platform development introduces special problems because the data to be audited may reside on multiple platforms. The best SCM systems provide a single point of access for auditing all development information. They also work across all kinds of development platforms, operating systems, network protocols and hardware platforms, and provide tailored clients within the developer's preferred development interface.

Security

In a mainframe or UNIX-only environment, it is possible to define an executable as having a user ID. You then create "permissions" on shared development directories to limit user access. On Windows/PC platforms, this security is absent. The SCM system itself must provide the ability to control access, including secure, protected access via the Web.

How to Begin

The decision to invest in software configuration management is a strategic one. It involves an initial commitment of resources and time. Results may or may not be immediately apparent. However, this is an investment that will serve

your organization well into the future.

Dedicated teams within a corporation, or smaller businesses, are able to begin with a relatively simple investment: version management and change tracking. These two alone will help organize and protect software assets, and speed change implementation with fewer dropped hand-offs or missed bugs. Automated change tracking and team communication are a valuable next step for software development as well as web content management.

Automated builds add still more reliability and repeatability to development, and can help compress the release timeline.

For highly complex development projects, or those that must adhere to customer warranties, standards or certifications, process control can be added. Process-enabled SCM helps you define product lifecycles, guarantee adherence with checkpoints and approvals, and manage baselines, versions, builds and releases. Moreover, you can dynamically view the impact of changes on timelines and project deliverables.

If your organization uses packaged enterprise applications, you will want a solution that identifies and assesses the differences between a vendor release and your current customizations. Your packaged application change management tools should easily integrate with your overall SCM toolset.

And, if you have a public website, a corporate intranet, an extant or all of the above, you need to expedite page design, content contributions and publishing.

MERANT and its PVCS products enable end-to-end change management. You can select the specific change management toolset and approach that works best for your organization, and scale up or down as needed to adapt to change.

SCM Business Value

There are subjective and objective measurements for assessing the “value” of SCM. For example, one way is with the Capability Maturity Model (CMM) from the Software Engineering Institute at Carnegie-Mellon University. The CMM defines key process areas for software configuration management and is similar to ISO9000, but it is geared specifically to development and the process areas involved in creating, changing and delivering software throughout a product’s lifecycle.

Level 1 is really not a level of maturity at all, but a state of *ad hoc* development where few, if any, processes for change management are enforced. Frankly, it is a state that many businesses have inadvertently found themselves in, as development complexity and demands for new capabilities have overwhelmed development teams and home-grown change tracking systems.

Table 1. Levels of the CMM with Key Process Areas

Level	Key Process Areas
1. Initial Ad hoc, even chaotic; success depends solely on individual heroics	– Not applicable
2. Repeatable Basic project management to track functionality of application and cost and schedule of project.	– Requirements management – Software project planning – Software project tracking and oversight – Software subcontract management – Software quality assurance
3. Defined The process for management and engineering is documented, standardized and integrated. All projects use an approved version of the process.	– Organization process focus – Organization process definition – Training program – Integrated software management – Software product engineering – Intergroup coordination – Peer reviews
4. Managed Detailed measures of the software process and software quality metrics ar collected. Process and software products are understood and controlled	– Quantitative process management – Software quality management
5. Optimizing Continuous process improvement is enabled by use of metrics and from piloting innovative ideas and technologies.	– Defect prevention – Technology change management – Process change management

Process Maturity Payback

The CMM can serve as an example of how process maturity translates to improved software quality and lowered costs.

Simply moving from Level 1 of the CMM to Level 2 represents significant improvements, which lead to bottom line benefits.

In an SEI report (SEI 92-TR-24), data was averaged over 1,233 separate projects in 261 organizations spanning 10 countries, to gauge the benefits of reaching higher maturity levels. The data was normalized to a 200K line-of-code project.

Table 2. Observed CMM Benefits

Maturity Level	Calendar Months	Effort (Work Months)	Defects Found***	Defects Shipped	Total Cost
1	29.8	593.5	1348	61	$5,440,00
2	18.5	143.0	328	12	$1,311,00
3	15.2	79.5	182	7	$728,00
4	12.5	42.8	97	5	$392,00
5	9.0	16.0	37	1	$146,00

*(*** Defects found during development process.)*

The results are dramatic. A maturity improvement from Level 1 to Level 2 alone speeds time to market by 38 percent, eases the workload by 76 percent, and improves product quality by 80 percent (in terms of number of defects shipped). The cost at Level 2 is only 25 percent of the costs at Level 1. Note that for a fully mature process, the cost savings is nearly 98 percent compared to doing a similar project without process maturity.

Conclusion

When you have the infrastructure to proactively manage change, the fast pace of development no longer leaves you behind—it's an opportunity to get ahead.

It's no coincidence that every Fortune 100 company has in place a system for software configuration management. It's no longer a frill to manage development, it's a necessity.

Your business, too, can benefit from the advantages of organizing, managing and protecting software assets during change. We invite you to contact us for a personalized assessment of how your organization can benefit from MERANT PVCS products and our expertise in software configuration management.

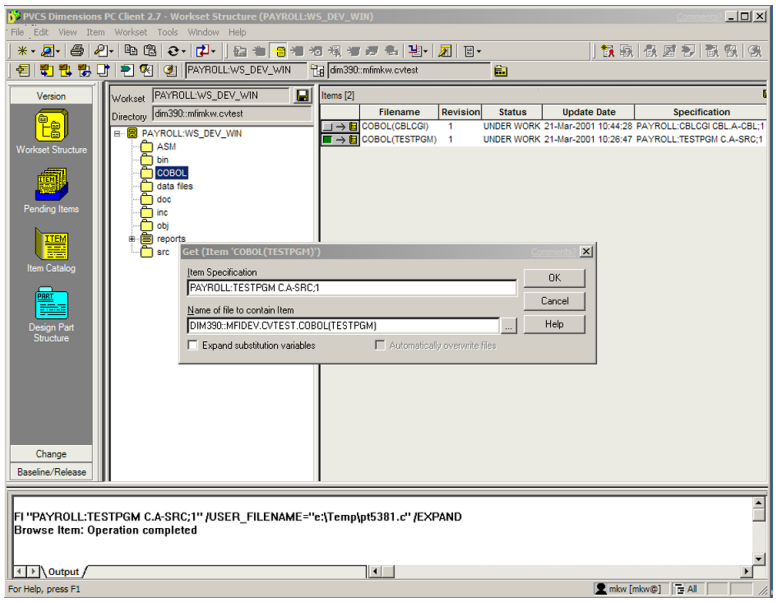
OVERVIEW: MERANT PVCS Products for Change Management

Managing change is one of the most significant business challenges you face.

MERANT's PVCS products enable you to use change as an opportunity — a chance to continually improve, hone and focus on customer satisfaction.

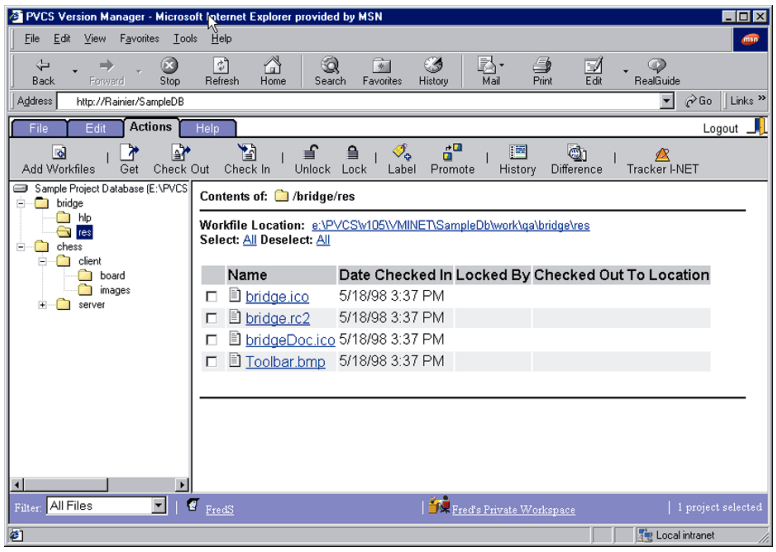
PVCS includes tools for software configuration management, change management in packaged Oracle applications and web content management— the only solution that extends to manage all kinds of change in code, content and digital assets, with the flexibility to scale from the individual developer to the global enterprise.

- **PVCS Dimensions** provides, in a single platform, comprehensive process control, versioning, baseline management, issue management, release management, build management, and workflow management. For teams of all sizes, from small and nimble to the entire globally distributed enterprise and for simple or complex projects.

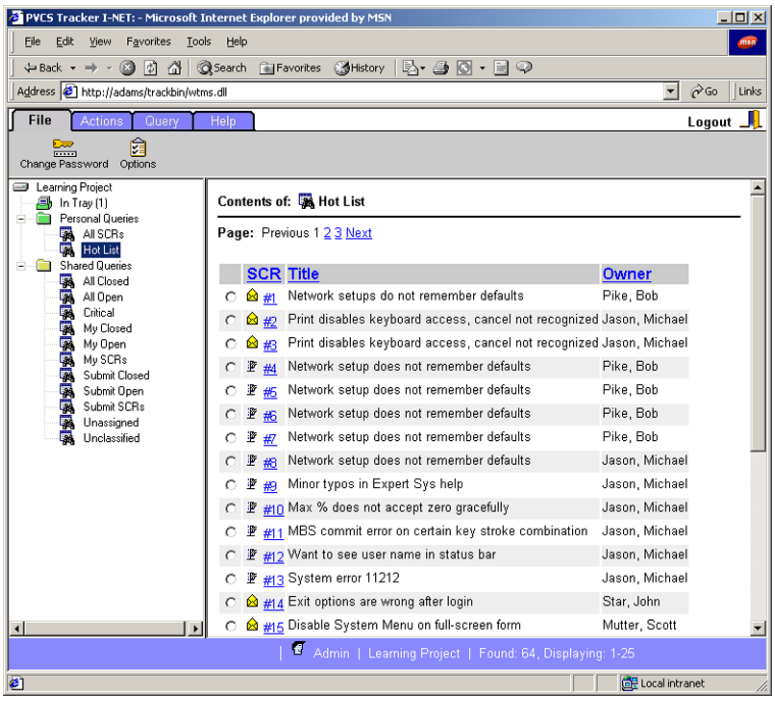


- **PVCS Professional** utilizes basic process control to provide versioning, issue management, and configuration build capability -- all in a single package. For small to medium size teams, it can be rapidly implemented, ensuring the protection and management of software assets. These teams are coordinated and communicating at every step, as they build reliable systems with reduced time to market. It combines the capabilities of PVCS Version Manager, Tracker and Configuration Builder.

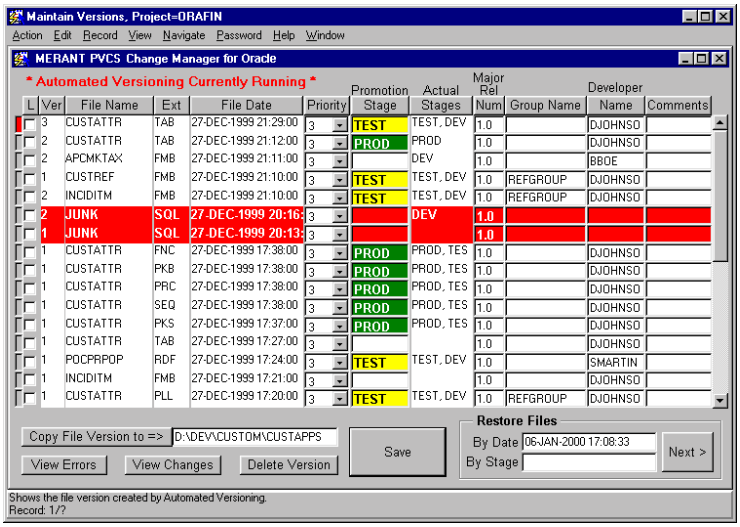
- **PVCS Version Manager** is the industry standard for version control for small to medium size teams. Managing and protecting software assets, it supports parallel development and multiple active versions, with easy-to-use, intelligent resolution of version conflicts.



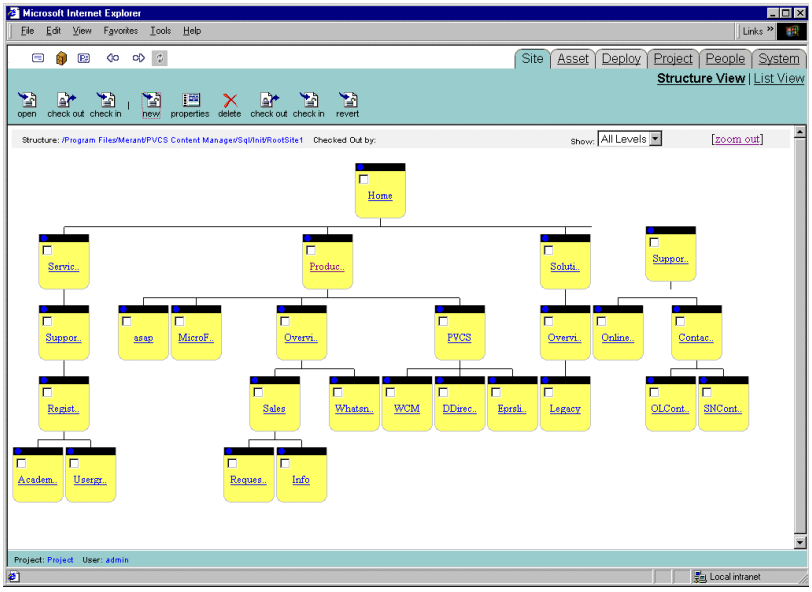
- **PVCS Tracker** captures, manages and communicates changes from emergence to resolution. It tracks status and imposes basic process control to ensure coordination and communication across teams.



- **PVCS Configuration Builder** automates the build process and ensures that the correct version files and components are used in the build. Build processes become reliable, repeatable and fast.
- **PVCS Replicator** enables distributed development and coordinates geographically diverse teams that have shared requirements for process compliance and code access.
- **PVCS Enterprise Release Manager** integrates the development and distribution stages of the application lifecycle for users of the Tivoli enterprise management environment.
- **PVCS Change Manager for Oracle** manages and protects your Oracle packaged and custom-developed applications, accelerating the adoption of changes and new releases.



- **PVCS Content Manager** allows the management and delivery of dynamic web content and applications for intranets, extranets, and the Internet. Providing collaboration, content management, enterprise integration, and application services, it is the complete enterprise platform for web content management. With support for distributed authoring yet with centralized control, it allows the entire enterprise to become content contributors. It is a highly scalable open platform, based on industry standards, that allows content contributors to use the tools they know.



FOR MORE INFORMATION

MERANT is the leading provider of software solutions for enterprise change management; development, transformation and integration of legacy applications; and data connectivity. More than 5 million professionals use MERANT technology at 60,000 customer sites, including the entire Fortune 100 and the majority of the Global 500. Founded in 1976, MERANT has 1,700 employees and more than 600 technology partners.

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