

# Configuration Management

## Coming of Age in the Year 2000

Clive Burrows  
Ovum, Ltd.

*Some estimates show that the market for configuration management (CM) tools and services now exceeds \$1 billion per year and is still growing rapidly. The market size and growth has led to many of the founding companies in the CM market being acquired by larger companies with no history of involvement in CM. This article summarizes the proven capabilities of CM tools that have created a market of this size and reviews the potential areas for future development—most notably CM control of Web site content. It also summarizes the potential impact of these acquisitions on users and notes the rise of new companies entering the market with good cost-effective products.*

Configuration management is the key to managing and controlling the highly complex software projects being developed today. CM tools have developed from simple version-control systems targeted at individual developers into systems capable of managing developments by large teams operating at multiple sites around the world. The variety of tools offered means that you can be sure to find one that is a close match to your individual needs.

The need for this degree of team support has grown in response to time pressures on software development and the increasing need to manage multiple changes to the same software at the same time. For example, resolving year 2000 (Y2K) compliance problems while still developing new features and fixing bugs.

As a result, the market for CM tools exceeded \$1 billion in 1998, and many of the smaller companies that created the modern CM capability have been swallowed up by the large players in the software arena. Even so, the growth in the CM market is so strong that there is still room for new entrants to introduce new products and to compete successfully.

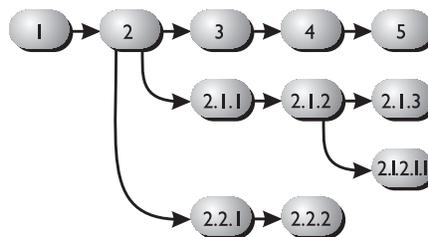
### Key Feature of CM Tools

The key capabilities of CM tools are the identification and control of software and software-related components as they change over time.

For most users, the main issue is the tool's ability to support a project team

that develops software in a single repository, even though individual members of the team may be at different locations connected by a network. Individual members of the team need to be able to undertake the tasks assigned to them without interference from other team members. However, as each task is completed, the results need to be made avail-

Figure 1. A typical revision sequence.



able to other team members to assimilate into their own work at a time of their choosing.

Version control, the original CM requirement, maintains a history of the changes to a component as it evolves over time and allows users access to a particular version—not just the last version created.

### Parallel Working

Originally, when team sizes were small, the accepted wisdom required CM systems to prevent several users from attempting to change the same component at the same time. Many organizations still attempt to operate with this “safe” development discipline. However, two important developments have combined to allow multiple users to

change the same root component without undue risk.

The first development was the extension of version-numbering systems to support branches and therefore parallel developments by different users along different branches of the version tree. Figure 1 shows a typical revision sequence and numbering scheme including the creation of new development branches.

The second development has been the availability of merge tools with a strong graphical interface, which assist the resolution of conflicts when changes made on different branches are merged back into the main development stream. The best merge tools can relate all changes to a common ancestor (in Figure 1, revision 2 is the common ancestor of all branches emanating from the original single stream of development) and can therefore accept many changes automatically with only conflicting changes being raised for user attention.

The capability of modern merge tools is now so strong that users can become tempted to accept the tools' automatic resolutions and omit essential testing processes. This is not recommended.

The branching approach to parallel development is used in a few tools to support the cloning of software repositories across a number of geographically distributed sites or even companies, e.g., for consortium projects. In these circumstances, the issue becomes the level of capability to support the periodic synchronization of databases between sites.

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The individual cloned repositories are never at an identical state, but over time all changes are applied to all sites. The repositories may be different at any time, but the differences never become too great and are always controlled at a manageable level.

### Web Interface

New developments in almost all CM tools are the provision of some CM functionality through a Web browser interface. There is still a big difference between the CM tools in the degree of support provided. Apart from those with no Web access capability, the minimum support tends to be for problem and change management systems and for information reporting systems, i.e., all those aspects with a minimum requirement for data transfer. Only a few tools provide a check-in, check-out facility to access and modify files through a Web interface.

Some tools prefer the higher bandwidth solution of a "cut down" client for home CM access via a modem into the organization's network.

### Change Management

Change management features address the issues of problem tracking and change control and the presentation and analysis of management information derived from these sources. Gathering management information is greatly simplified if change features are part of the CM system—without them, complex cross-references between different databases are required, and full navigation and searching may not be possible.

Unfortunately, many CM vendors have developed their own add-on capability in this area using new development tools, different databases, and even a different style of user interface. In some cases, the only area of commonality is the product "badge" name created by the marketing department.

### Build and Release Support

Building systems can take days, and an inefficient build process can waste hours of developer time, particularly during testing and integration when you may need to build the whole system to test a

small change. An intelligent build process can reduce build times dramatically by reusing partially built items from previous builds.

Release support allows developers to track which users have which versions of which components and, therefore, to be sure which of those will be affected by a particular change.

### Process Management

Many users, particularly those seeking an external quality approval such as ISO 9000 or a particular Software Engineering Institute Capability Maturity Model level, have standard development processes they expect their development teams to follow. In the past, this has often involved considerable bureaucratic paperwork procedures, which are generally resented and ignored by developers.

The process management features in CM tools allow the developer to ensure that components progress through chosen lifecycle phases before being released. An example of this is to help ensure that testing and quality assurance occur before release. The tools take a wide range of approaches to process management, and it is important to select one that suits the culture of your organization or the new culture you wish to introduce.

## New Developments

### Year 2000

This is an immediate, if short-term, opportunity for CM tool vendors. Traditional CM support for multiple streams of development activity is becoming increasingly important as the millennium approaches. Y2K conformance issues must be addressed in parallel with new developments and with bug fixes. In addition, governmental and regulatory action to open up markets is requiring European utilities—and in the near future, U.S. utilities—to modify their systems to support competition. Financial institutions and multinational corporations worldwide need systems to cater to Euro currency. This degree of parallel working is not sustainable without strong CM support.

Y2K activities also have a different characteristic from normal development

work. About 60 percent of all Y2K effort is spent on testing. As problems are found, traditional change management processes are applied to ensure that all changes are pursued to completion and that adequate retesting takes place. Individual modules need to have their compliance status logged to allow a full audit trail to be established. If a new Y2K issue is identified, selective retesting of previously "compliant" modules may be necessary. CM tools have features to support all these requirements.

Although Y2K issues are seen by most users as short term, the emphasis on test management will provide long-term benefits for all users of CM tools well beyond Dec. 31, 1999.

### Web Management

CM support for Web and particularly Intranet pages and their embedded objects is creating an important new market for the vendors of CM tools, which in time *could* exceed the size of the market for managing software development.

To develop this new market opportunity, vendors have to address three main issues:

- Different characteristics associated with Intranet and Web management.
- Different user skills and profile of Intranet and Web developers.
- New marketing issues to be addressed to attack this market.

The different characteristics include sheer size—the number of pages being managed for an Intranet site can be more than 100,000, implying a requirement to manage more than 500,000 objects. By contrast, 10,000 software modules would represent an extremely large software development program.

The rate of change for Intranet pages is high, but the lifetime of a typical page can be relatively short. This is associated with an extremely high level of build and release operations. It is not unusual for a large Intranet site to be changed on a daily basis, whereas for large software systems, a new release every month would be regarded as an indicator of serious instability.

Intranet sites can contain commercially and legally sensitive information. For protection against lawsuits, not only

Is your system vulnerable to version-control problems? Is your documentation lacking (or nonexistent)? Are you able to track down errors quickly, or do you just write patches to fix the unseen defects and pray they will hold?

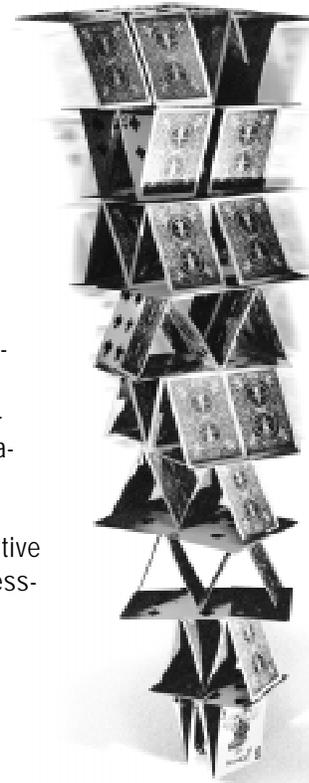
Don't wait around for the year 2000 or another "minor" problem to snatch away the component that causes all your hard work to collapse around you. Start now to implement a strong configuration management (CM) program that will ensure your "house of cards" against disaster.

The Software Technology Support Center CM team is committed to helping you reach and maintain your CM objectives. We will help you formulate a systematic strategy for changes and improvements, and most important, we will be there to guide your organization step by step through the entire CM improvement effort.

Our services include CM Consulting and Implementation, CM Capability Evaluation, CM and Standards Workshops, CM Executive Session, CM Tools Evaluation, Independent Documentation Assessment, and Process Work-flow Consulting and Implementation.

Paul Hewitt  
Voice: 801-775-5742 DSN 775-5742  
E-mail: Hewittp@software.hill.af.mil

Reed Sorensen  
Voice: 801-775-5738 DSN 775-5738  
E-mail: Sorensenr@software.hill.af.mil



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does a full audit trail of approvals need to be kept, it also is essential that a precise copy of the Intranet site on a particular date can be faithfully re-created when required. The volume of configuration information needed to accomplish this is phenomenal. In comparison to that needed for software configuration management, it is like comparing the number of Internet servers in the universe to the number of servers in a single company.

All CM vendors can truly claim a capability to address the individual issues raised here—this is why they believe that, in time, CM Intranet management will be a bigger gold mine than CM for software development. The issues, however, are not all related to functionality. There also are scalability issues. Vendors that attack the Intranet market will need a strong partnership with pioneering users to demonstrate this scalability. Other vendors can still market their

smaller-scale systems to manage the smaller public Web sites.

A large information technology (IT) development might involve hundreds of people, nearly all assigned full time to the project. A large Intranet site might have more than 10,000 contributors, each probably spending no more than a few hours each month updating elements of the Intranet pages to which they contribute. A much smaller group of webmasters (broadly equivalent to build managers in an IT project) are responsible for managing and publishing the Web and Intranet content.

None of these people are CM aware, nor do they want to be. The providers of Web content are most likely to use Notepad or a word processing package, whereas the webmasters will certainly use Web-based tools for their day-to-day tasks. It is essential in this environment that vendors integrate their CM functionality seamlessly within the tools used

for day-to-day tasks. It also is highly desirable that CM terminology be minimized, for example, by referring to a third draft rather than to Version 3.

Access to the CM functionality needed by webmasters should be via a Web interface to minimize the need to switch styles of working.

Most CM tools already have a degree of support for CM functionality via the Web and can readily integrate with a wide range of third-party tools. Some vendors have gone so far as to repackage their software CM systems (including the product documentation) with additional functionality to create a product targeted directly at this market (Web Integrity from MKS, WebSynergy from Continuum, and StarTeam from StarBase are examples). Other vendors are doing little more than make reference to Web issues in their promotional literature.

To fully exploit the Web management market, CM vendors have three other hurdles to jump—not technical issues but marketing issues.

First, they do not know how to find the potential buyers. In a software environment, vendors often find potential buyers coming to them, and they gain good links with IT managers and other project managers as the word spreads that these products really work. The potential buyers for Web management CM tools are not so easily found.

The reasons for this are the second and third hurdles: The potential buyers are not aware that they have a problem, and even if they were aware, they have no inkling that CM is the answer.

It has taken six years for CM vendors to establish a software market for capabilities beyond simple version control. Even so, their market penetration in an area they know well is still only 20 percent. CM vendors have a capability to satisfy a latent market need for managing Web and particularly Intranet sites, but they first have to establish market awareness. Currently, the potential Web market could dwarf their traditional software market, but for now they have 0.01 percent of a lot—which does not amount to much.

### Documentation Support

The competition CM vendors face in the Web management market will be from document management systems. Although these systems have zero version control capability, they are perceived as being closer to the needs of Web site managers. And this perception is true. Document management systems *are* closer to the needs of Web site managers than CM systems—but only in the sense of their position in a queue of issues that have so far failed to get the attention of Web site managers.

Document management systems do have features that assist webmasters but these are not in conflict with the features offered by CM tools. In fact, document management systems are extremely poor at version management and related CM issues and would benefit from closer links with CM tools.

Many CM tools are starting to offer support for documentation development via integration with such products as Framemaker. The version and configuration support for documentation tends to be at a relatively high level (chapters or major document sections), but it also includes support for a document “build” process. In the future, this support will extend to CM management of embedded objects within the document, e.g., diagrams and pictures. This management of embedded objects in documents is closely allied to similar issues within Web pages. The vendors’ development money is going into solving the Web management issues, but the spin-off will be a much stronger capability to manage many types of complex documents.

### Tool Integration

Historically, most CM systems have targeted the management of software sources held in ASCII files. The scope of support provided for this environment is not necessarily available to users of Integrated Development Environments (IDEs) or fourth-generation languages (4GLs), which are not file based but repository based. There is little that CM vendors can do to add full CM value to products in this group until they are given access to the elements within the repository. This is starting to happen as users of these environments start to suffer the problems first encountered by COBOL and C developers. The IDE and 4GL systems that fail to offer links with CM systems are adding to the development risks of their customers instead of reducing them as they promise.

### Project Management

A new trend, so far supported by just a few products, is to use the development progress information held within the CM system to link with project management systems such as Microsoft Project. In principle, this should add an extra dimension to the progress information available to project managers. This is not yet the case, but the process has started. And in the future, the scope of what is considered to be CM will undoubtedly

include strong links with project management systems.

### The Players

The original players in this market were small, innovative companies that jointly created a \$1 billion market from a small base of users who were previously only familiar with free version-control software.

As user demands for team support grew, the inadequacies of the free version-control software became apparent (free software rarely provides value for money). The new products offered much more capability, and the companies developing them were strongly focused on CM alone. By 1995, these companies were well established, had a strong user base, and were doing business in a market that was still growing strongly. Some became quoted in the NASDAQ<sup>SM</sup> (National Association of Securities Dealers Automated Quotations) index, while others preferred to remain private.

Neither choice changed the outcome. Almost all the founding companies of CM are now owned by “software conglomerates.”

- TeamOne was bought by Legent, and their TeamNet product was renamed Endeavor/WSX. Legent, in turn, was bought by Computer Associates, and Endeavor/WSX was renamed Endeavor/Unix.
- Platinum bought Softool, and for a change, did not rebrand the CCC product range.
- Atria was bought by Pure Software, and subsequently, Pure Atria was bought by Rational. Products such as DDTS were badged with the Pure name (PureDDTS) and subsequently with the Clear name (ClearDDTS) to establish an association, however loose, with the ClearCase CM product.
- Intersolv bought SQL Software and rebranded PCMS Dimensions as PVCS Process Manager and then confused the buyers when it sold Process Manager only with a package of other PVCS products and named the package PVCS Dimensions.

## New JTA Version Announced

The Architecture Coordination Council (ACC) met May 28, 1998 and approved the Technical Architecture Steering Group Majority Position Document. The implementation memorandum dated Nov. 30, 1998 signed by the tri-chairs of the ACC makes Joint Technical Architecture (JTA), Version 2.0 effective for use immediately, superseding JTA, Version 1.0.

The JTA is a document that mandates the minimum set of standards and guidelines for the acquisition of all Department of Defense (DoD) systems that produce, use, or exchange information. The JTA shall be used by anyone involved in the management, development, or acquisition of new or improved systems within DoD.

The memorandum, JTA, Version 2.0, and related information is available on the Data and Analysis Center for Software Web site at <http://www.dacs.dtic.mil/databases/url/key.hts?keycode=2024>.

The JTA provides DoD with the basis for seamless interoperability of information technology systems. The JTA defines the service areas, interfaces, and standards (JTA elements) applicable to all DoD systems, and its adoption is mandated for the management, development, and acquisition of new or improved systems throughout DoD.

The JTA consists of two main parts: the JTA core and the JTA annexes. The JTA core contains the minimum set of JTA elements applicable to all DoD systems to support interoperability. The JTA annexes contain additional JTA elements applicable to specific functional domains (families of systems).

The JTA is a living document and will continue to evolve with the technologies, marketplace, and associated standards upon which it is based.

Within just a few months, Intersolv was acquired by Micro Focus.

- In December 1998, a relatively new entry to the market, Tower Concepts (Razor), was acquired by another privately owned company, Visible Systems Corporation.

Most acquisitions have been by companies with little experience in CM that aim to buy a stake in this market. The acquisition cycle is not yet complete.

While acquisitions of this nature can introduce additional funding for product development and synergy with related products, the end result is not always good news for the user.

- After the acquisition, there is usually a period of quiescence while the buying company tries to understand what it has bought and the bought company tries to understand its new environment.
- After the quiescent period, expenditure on marketing and related issues tend to get immediate priority over technical development issues—the new owners want a return on their investment quickly.
- Support is rationalized, i.e., reduced, by integration with established “help” desks, which lengthens lines of communication between the user

and the people who know what they are talking about.

- New development expenditure becomes directed at integrations with the conglomerate’s “Enterprise Support” products. They do this in the name of providing wider support for all users, but in reality, it benefits the conglomerate’s existing customers by giving them a CM capability. The CM user gets offered related “enterprise” products that they do not want.
- Overseas dealers are often disenfranchised in favor of the conglomerate’s local office, which gives established users even less support.
- Small users are no longer nurtured as the big corporate sell takes over—10 licenses no longer motivate the salesman who now needs 50 license deals to keep on target.

Of course, the new owners are still making money—the increase in sales outlets and sales resource makes this almost inevitable—but they do not have it all their way. One effect of these ownership changes and a sure sign of a growing market has been the emergence of a new group of small companies (Perforce, StarBase, and Tower Concepts—still small despite being acquired by Visible Systems Corporation, another privately

owned company) that targets just those project groups favored by the developers of this market with proven developer-oriented messages.

### Conclusion

There are over 50 companies that offer products to meet CM needs. Most are expanding their business and profits, and there is no sign of this declining. The main competition for CM vendors is still the users’ lack of awareness of the success and capability of this technology. People do not wake up in the morning with “It’s time to buy a CM tool” at the top of their to-do list. Instead, they wait for a foreseeable and inevitable disaster to kick-start the process—and then they usually buy from the first company they call. Make sure you do not do this by being an educated consumer. ♦

### About the Author



**Clive Burrows** is principal evaluator of configuration management products for Ovum in London, England. He is the author of four Ovum reports on this subject, the most recent being *Ovum Evaluates: Configuration Management* (June 1998).

E-mail: [clive\\_burrows@compuserve.com](mailto:clive_burrows@compuserve.com).