Overview of Content Management Approaches and Strategies

VIPUL K. GUPTA, SRINIVASAN GOVINDARAJAN AND TONYA JOHNSON

INTRODUCTION

According to Malcolm Frank (as cited in Fruehling and Digman, 2000) electronic commerce (EC) is the electronic exchange of information, goods, services and payments and includes the creation and maintenance of web-based relations. Therefore, EC includes, but is not limited to, the Internet, intranets, extranets, electronic data interchange, and others. EC has resulted in fundamental changes to the way in which organizations worldwide do business with each other and with consumers (Parker 2000; Vogel et al. 1997). However, the explosion of ever-changing content in this increasingly web-centric business climate leave the groups responsible for developing websites and other electronic content at the risk of becoming dysfunctional – if they are not already there. Let’s take the example of the World Wrestling Federation (WWF). It launched its website in 1998 and by early 2000, its information technology (IT) department found itself buried under 25,000 documents, video clips and images, all created and managed manually with Microsoft’s FrontPage authoring software (Booker 2000). The WWF and hundreds of other websites are rushing to learn how to manage content volume that grew well beyond their expectations. What starts out as a pure informational site with content stored statically in flat files...
ultimately requires sophisticated document or content management functions like version control and change management. If not already doing so, most large firms will soon draw text, graphics, and multimedia from many sources for delivery to multiple devices and countries. This will give companies in manufacturing, retailing, and the financial services sector the same content management needs that media companies have, and give media companies the content issues faced by portals today (Dalton et al. 2001). Analyst firm Meta Group predicts the market for Content Management (CM) tools will grow from $800 million in 1999 to a whopping $10 billion by 2004 (as cited in Patrizio 2000). CM provides a framework for creating, managing and publishing electronic content whether on the Internet, intranet, or other enterprise-wide systems. CM is a combination of technology and business processes: technology that facilitates the creation, storage and delivery of content; and business process and workflow essential for a successful implementation of the technology.

WHY CONSIDER CONTENT MANAGEMENT?

Often, after the triumphant launch of a company website and e-commerce strategy, comes the aftershock: How do we maintain this web application? Companies are finding that they quickly outgrow their websites’ scalability and usability. Typical signs of a crisis include the inability to support increased volume, react to mergers, or handle updates (Dart 1999).

The amount of information and data created for internal and external use at any medium or large size organization is staggering. Reports are created; corporate, departmental and project websites are launched; literature is produced . . . the list is endless. Where is it stored? How can it be retrieved? How can it be catalogued for shared access? Can it be easily shared across different applications? Typically, various business units within a firm undertake separate approaches to solving these issues, resulting in an array of CM tools and homegrown solutions that address only their particular concerns.

In 1999, Forrester Research interviewed 50 practitioners and found that 56% of them do not buy CM tools to administer their web assets and content (Manning et al. 1999). Respondents’ content almost doubled in size from 1998 to 1999, and they expected it to double again in 2000. Companies not deploying CM strategy and tools end up with websites and Intranets with thousands of handcrafted pages that are served up from a complex nest of flat files, each ineptly managed by the authoring tool that created them. Therefore, it is clear that the implementation of a corporate-wide CM system offers several important opportunities:

- Re-engineer business processes for collaboration and sharing across divisions and applications. Implementing a CM system provides the opportunity to evaluate and refine existing processes. It also provides an opportunity to formulate new business rules for managing information.
- Manage web publishing costs. As corporate websites and Intranets grow in complexity and size, total web publishing costs will continue to rise. The GartnerGroup, a business technology research organization, estimates the cost per page for a website of medium complexity with more than 2,000 pages to be between $100 and $3,000 per page (Drakos 1999). Therefore, implementation of a sound CM system will help organizations manage these costs.
- Create information that is searchable and easily retrieved. Hard copy files that store documents can be difficult for the creator to find and impossible for others to utilize. Documents created within a CM system can be stored in a central database with relevant tagging information, and retrieved with a simple keyword search for use on any platform.
- Realize search, retrieval and collaboration benefits for secure or sensitive data. In order to avoid passing files that contain sensitive information, it is common to send a file in a confidential envelope and hope that it does not fall into the hands of an unauthorized person. Most CM tools provide for the creation of content that is tagged with varying levels of security to restrict access to authorized users and editors.
- Create a more dynamic website. Companies such as Land’s End, Amazon.com, and Yahoo! are setting and raising expectations for web features like personalization, webcasting, and instantaneous content changes. The use of CM tools and workflow can be a good starting point for organizations to position their websites for personalization and other future innovations.

CONTENT MANAGEMENT LIFECYCLE

We propose a framework (Figure 1) for the content life cycle, consisting of three distinct phases: Creation, Storage and Delivery. The business units within an organization define the policies for CM during each of these phases while technology implements the policies. A brief description of each of these phases follows.

Content Creation

- Template – a template is a pre-designed format that provides a consistent look and feel to the same type of content. Examples are templates for fax cover sheets, brochures, or newsletters.
- Authoring – identifies who can author and or edit content.
- Notification – the content reviewer receives electronic notification that a document has been created or edited and needs to be reviewed.
• Authentication – ensures the identity of the editor(s) and reviewer(s).
• Approval – ensures that the required level of approval is received before the content can be passed on to the next phase.

Content Storage
• Organization – content that has iterated through an approval process, along with the history of that process, is stored in a repository. This repository could be a database, a file system, or a combination of both.
• Versioning – all previous states or versions of the content are maintained and available for use.
• Workflow – the real-time routing of content, including notification, approval/rejection and revision.
• Archiving – the offline storage of information can be made available upon request. Management will need to agree upon standards for how long content should be stored before it is deleted.

Content Delivery
• Retrieval – the mechanism to search, sort and retrieve information by authorized users.
• Presentation – the mechanism by which the content and its template are merged for publishing. The use of stylesheets helps to merge the same content and its template to one or many different output media or platforms for publishing.
• Publishing – approved content is distributed to one or more platforms, including the Internet, the intranet, Personal Digital Assistants, email, or printers.
• Personalization – allows user-defined preferences to determine what and how content is presented. While personalization is most often considered as a business-to-consumer marketing application, used in cross-selling, upselling, ad placement and so on, it is also a business-to-business or internal management issue (Gilbert et al. 2000). Internally, business roles such as manager, graphic designer, and call center representative can all be presented customized information related to their roles in the organization and given access to appropriate files and resources. Business suppliers can use a CM tool to tailor content to corporate accounts that reflect special pricing or product availability based on location.

COMMON APPROACHES TO CM

From the content life cycle perspective, there are three common approaches to a Content Management solution. Which solution a company should adopt is determined by its specific needs. These approaches are discussed in the following sections.

Content Management Over the Entire Content Life Cycle

In this approach, the implementation of a vendor tool automates functions across the entire content life cycle. An advantage is that the chosen vendor/tool attempts to address all of the requirements of the Content Management life cycle. The firm choosing this option may be limited to using the vendor’s proprietary creation and presentation tools. Vignette and Interleaf are vendors that provide this type of end-to-end solution.

Content Management Over the Content Storage Phase Only

Content Management over the storage phase only concentrates on the automation of the storage functions within the content life cycle. Here, the advantage is that
users can leverage existing and presumably new technologies for the creation and presentation of content. TeamSite by Interwoven uses this approach.

Architectural Approaches

In the context of the two approaches discussed above, complete content life cycle and storage, there are three basic architectural implementations:

1. **File** – in the file-based approach the file system serves as the content repository and is the basis for a CM system. The basic file-based system provides no automated CM functions like approval and workflow, but these functions can be customized as add-ons. File-based systems work only for smaller groups in a loosely controlled environment. As the need to access larger quantities of content increases, this tends to be a less viable solution.

2. **Database** – at the heart of every CM system, there is a database that stores the site’s catalogue of templates, applications and page elements. Relational databases such as Oracle 8, SQL server or Sybase continue to be favourite. A database implementation is better suited to control and monitor content from its creation to its archival. However, this approach makes it difficult for web search engines like Yahoo and Excite to search and retrieve content.

3. **Hybrid** – both databases and file-systems serve as content repositories. The biggest advantage is that the resources and the features of both approaches can be leveraged.

POSSIBLE SOLUTIONS FOR CM

For most organizations to flourish in the EC environment, prevailing policies and procedures for managing information are unlikely to be scalable where thousands of employees are potential contributors and collaborators for electronic content. Therefore, any CM approach that is selected will require the organization to recognize the cultural changes that need to accompany the technical solution. New roles and responsibilities will need to be created to provide a structure for generating compliance. As a result of the new policies, users may experience a loss of control. Groups that have adopted independent solutions may be asked to replace technology and processes that work perfectly for them. Users who previously had the freedom to make changes to content will resist adopting new policies. Functions that were loosely applied, like approval, will become formalized and hold specific responsibilities. These roles and responsibilities must be assigned only to the appropriate personnel. Once policies and procedures have been formulated, they must be integrated into the business.

The following three basic approaches to the integration of business rules and processes are associated with a CM solution:

1. Centralized approach
2. Distributed approach
3. Hybrid approach

Centralized Content Management

In a centralized approach, all content is funneled through one group, as illustrated in Figure 2. This group essentially acts as the ‘web police’ defining the company-wide business rules and procedures and ensuring that everyone abides by the rules. The business procedures address all aspects of the content life cycle. Many of the policing functions can be automated with the use of a Content Management tool. The greatest advantage of this approach is the resulting process control. One group establishes and enforces the rules and regulations, eliminating the possibility of different sets of rules for different groups. A major disadvantage is that all content must pass through this group which invariably results in a bottleneck.

Distributed Content Management

In a distributed Content Management approach, small individual workgroups are responsible for the content of their respective areas. It is the responsibility of these groups to oversee content quality. These workgroups contain authors and approvers who handle the notification/
approval process (Figure 3) and enforce the business rules and procedures. Each group may have one or more lead approvers. These workgroups could be a department or a smaller group of people working on a specific project.

Within the distributed approach, the central group described in Figure 2 still exists to define business rules and procedures. The major advantage of this approach is that the responsibility and the workload are distributed among various groups. The disadvantage is that the individual groups can interpret and enforce the business rules and procedures that were created by the central group differently.

**Hybrid Content Management**

A combined approach incorporates the salient features of both a centralized and a distributed approach. The combined approach uses a two-tiered approach (see Figure 4).

The central group determines two sets of policies and procedures covering the entire content life cycle, one for each tier. The top tier represents content with corporate wide distribution or content from official corporate groups, the lower tier represents local workgroups. The top-tier content represents official documents that require well-defined and specific procedures that are strictly enforced. The more stringent rules are designed to protect the organization from the widespread use of litigious or otherwise inappropriate content. For official corporate documents, the central group develops templates and document formatting. The group’s lead enforcer monitors compliance.

The lower-tiered content represents unofficial documents created and published by local workgroups. Local workgroups will adhere to the second set of less stringent, general policies. Each workgroup may require additional policies, which have been created and customized by the respective workgroup. In order for unofficial documents to be published as official, they need to conform to the more stringent corporate level requirements. The transition between the two tiers is a checkpoint where web police enforce corporate policies. These checkpoints also represent potential webmaster bottlenecks.
BENEFITS OF CM

Some of the major benefits of implementing CM systems include:

- **Enriched information sharing and collaboration.** Workflow functions and a common repository enable users across divisional and geographical boundaries to contribute to a project. Project managers can efficiently monitor the location and status of any assignment.
- **Improved data security.** Content must complete a defined approval chain before it can be published. Only users with appropriate access and authority can publish content, while only users with appropriate access can view the content.
- **Standardized approach.** CM promotes a uniform approach to managing information resources. Standardized training, administration, and support can be applied corporate-wide with few exceptions. CM also allows various corporate websites and intranets to have a consistent look-and-feel.
- **Scalability and cost efficiency.** The exploitation of intranet technology in corporations allows opportunity to every employee to potentially contribute content to the corporate, divisional or departmental intranet. With the help of a CM tool, this increase in the number of web pages and web contributors will not require a proportional increase in the number of technical support staff. Several Content Management vendors have created tools that allow non-technical staff to easily create and modify site content without having to learn the technical aspects.
- **Utilization of the same content for multiple media.** Style-sheets render content to multiple output media, resulting in reduced need for intervention by technical experts. Site-wide changes like updating a disclaimer notice or a logo become relatively simple.

CHALLENGES IN IMPLEMENTING CM

The greatest challenge to implementing a Content Management solution is not in the technology but in the adoption of business policies and rules that are necessary for the technology to be effective. Other challenges include:

- **Defining standards –** In the absence of policies, individual groups will be free to develop technical, design, and content solutions in different directions. Many of the standards built around XML are still in flux. However, the Information and Content Exchange (ICE) protocol by the World Wide Web Consortium is specifically designed to alleviate many content-management and data-exchange problems (World Wide Web Consortium 1998).
- **Communicating new policies –** While a CM system can provide a mechanism to collaborate and share data, the existence of the system will not change the business practices that inhibit data sharing. Users must be familiar with the new policies. Communication of new processes, rules, and workflow is the first step in gaining universal compliance.
- **Assigning roles and responsibilities –** Formulating procedures and policies to define the boundaries of the different phases of the content life cycle (as presented in Figure 1) and how to pass from one to another will require judicious assignment of roles and responsibilities. Bottlenecks between any two phases could result in performance degradation.
- **Selecting a best-fit tool –** There is no industry consensus on standard CM features and there exists no single vendor or tool that resolves or will resolve all CM issues. In order to choose a best-fit solution or tool, a clear understanding of corporate needs is required, which can be a daunting task. There are very few (if any) vendors selling CM systems that are useful out-of-the-box with painless integration into an existing site development/production/workflow environment. As a result, justifying the initial (and ongoing) expense for pricey commercial CM tools can be a big challenge (Mathews 2001).

SUMMARY AND MANAGERIAL IMPLICATIONS

The volume of information being published on intranet, extranet and Internet websites continues to grow at a rapid pace. Therefore, website content management is emerging as a mission-critical business problem that must be resolved and where controlling complexity is key. Today, the chaos of a large website can be compared to a library without the Dewey decimal system. As websites grow increasingly elaborate, moving from static collections of vanilla HTML pages to dynamic, data-driven products, it becomes more important to have some form of centralized content control and management in place. Home-grown solutions (or no solution) used to be the rule, but products that offer flexible, robust asset management, change control, versioning/rollback, approval and publishing, and site monitoring/maintenance tools are maturing and becoming indispensable for websites of all sizes and purposes. IT groups within organizations cannot compete with CM software specialists. The development time required to create and support flexible and feature-rich CM systems will stretch IT departments far beyond core competencies like streamlining enterprise-wide software upgrades (Dalton et al. 2000).

The web is well suited for moving new information to customers, employees and business partners in near-real time and for customizing that information to suit individual tastes, preferences and profiles. This customization, also known as personalization, is virtually impossible with static
HTML pages. Again, a webmaster bottleneck that slows production of personalized web content or a hiring frenzy to add pricey technologists can be avoided with a careful investment in content management strategy and tools (see Manning et al. 1999).

For easy distribution across various sites and devices – like Palm Pilots, web-enabled phones, and pagers – format independent documents will have to be created. Dynamically generated web pages using templates from a content management system give website managers the ability to create a web page once and then pour information into the page many times for different purposes and access devices. In the future enterprise managers will have to rethink the content delivery strategy for wireless devices. A site’s ability to deliver content to handheld devices is only one of many factors that create website magnetism. In a recent survey by Jupiter Media Matrix, 40% of consumers said they will visit a news or information site more often if its pages load faster, compared with only 20% who say a richer media experience will encourage them to make more frequent visits to a site. Other site characteristics likely to drive return visits to content sites include customized layouts, polling technology, and chat capabilities. Respondents showed little keenness for the ability of a site to deliver information to wireless devices, with only 15% saying such capability would be likely to make them revisit the site (Jupiter Media Metrix 2001).

Employee web publishing, or ‘informal publishing’ is becoming prevalent in most organizations. Content or knowledge managers must be willing to plan for the strengths and opportunities this affords as well as the challenges from both accuracy and legal standpoint (Fleming and Levin 1997). Organizations concerned about response to some future litigation involving the features and objects on their website should record the contents of their website. Content management systems can also help IS managers in such organizations by providing infrastructure for the recoverability and long-term auditability requirements of their business processes and transaction processing data capture.

Traditionally, commercial CM solutions were based on a Creation-centric model wherein their products focused mainly on the creation, review, workflow, and the general management of the content. A different breed of vendors – the Portal vendors – generally offered products that were based on a Presentation-centric model focusing on presentation, access, search and retrieval, and integration aspects of the content. As industry demand is increasing not only to store content in a structured way but also to present it effectively, the pressure is on for CM vendors and Portal vendors to combine their presentation-centric offerings and creation-centric products and the same would be true for Portal vendors. Within two to three years, leading vendors in either space are expected to launch products that extend from content creation through to content presentation thus diminishing the space between CM and Portal products.

References


