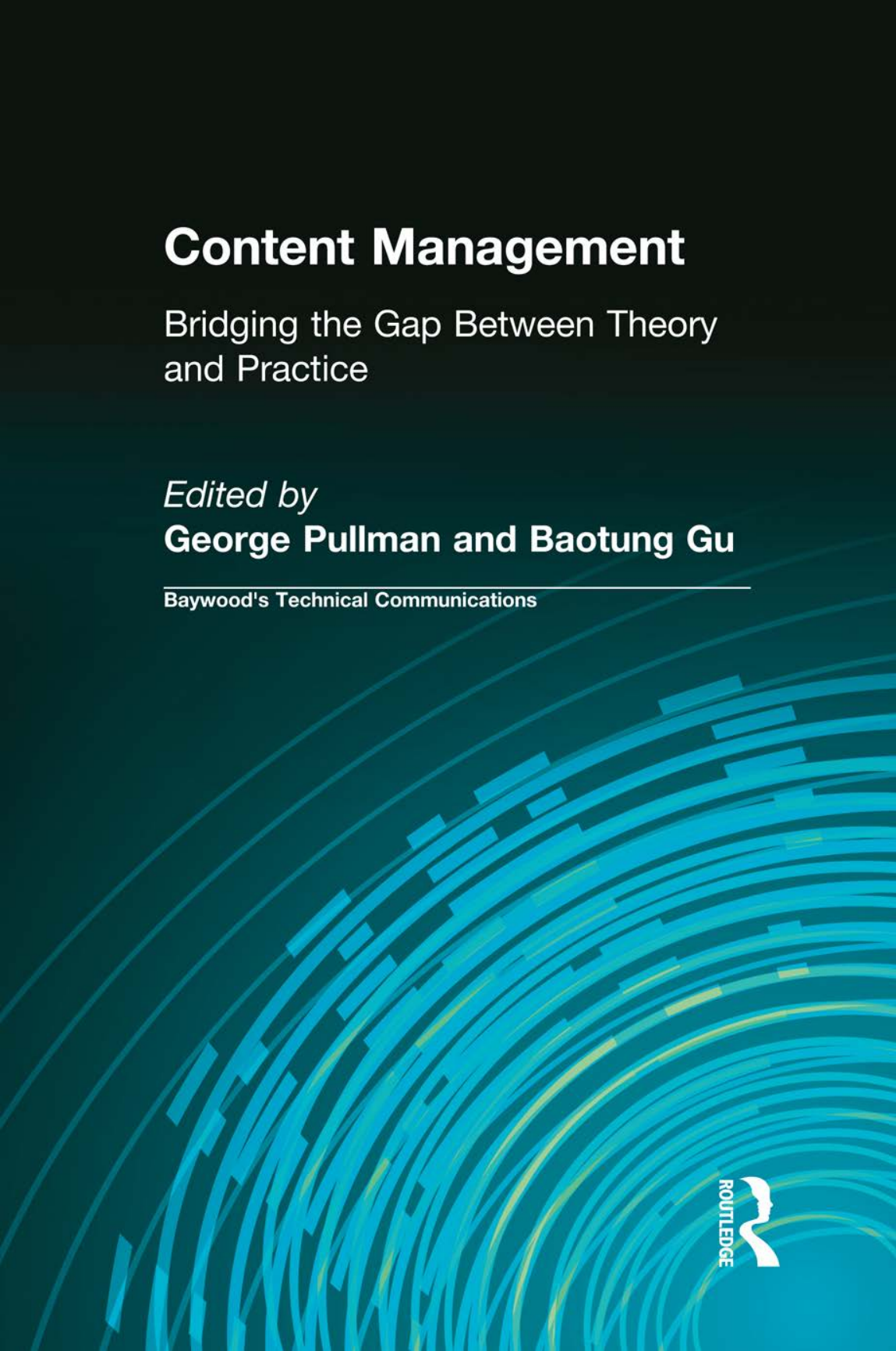
Content Management

Bridging the Gap Between Theory and Practice

Edited by

George Pullman and Baotung Gu

Baywood's Technical Communications



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Edited by

George Pullman and Baotong Gu
Georgia State University

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Introduction: Mapping Out the Key Parameters of Content Management

Baotong Gu and George Pullman

Any organization that gathers, produces, and provides information needs to have some systematic way to manage the process; it needs to know

- where the information comes from (authorship),
- how reliable it is (authority),
- when it was last updated,
- how many variations there are,
- how many iterations it has undergone,
- where it appears,
- whether it is intended for public, group, or private consumption,
- when it will expire, and
- and what other pieces of information it is connected to.

In addition, information producers have to ensure consistency in document design and style in order to maintain a consistent identity, a need traditionally provided for by boilerplates and style guides. In the days prior to Web publishing, the system consisted of an organizational structure and culture that would route information through a series of people: the knowledge worker(s), the typist, the editor, the section manager, the typesetter, and finally the distribution manager—whoever was in charge of getting the publication to its intended audience. Whether information management is embodied in a single individual or in many people, some systematic method for controlling the generation and distribution of

information is necessary, or else an organization has no idea what it is saying or how it sounds (see Boiko, 2005; Jeffery-Poulter, 2003).

The advent of Web publishing has increased the need for information management, because the complexity and expense of physical publication—document design, typesetting, and physical distribution—which tended to restrict who could say what within an organization and to whom on the outside, have been reduced and simplified. Given access to a Web server, anyone with even a minimal technological understanding can broadcast information to the world. Because information changes rapidly and going through the proper channels often slows down the process of distribution, people inevitably begin to use the technology to accelerate the process. Thus the volume of information being distributed has greatly increased while the control over information is becoming increasingly decentralized. When an organization's information isn't controlled by a central authority, the results can be duplication, inconsistency, invalidity, liability, and confusion. On the other hand, when an organization's information is controlled by a central authority, the results, from the knowledge workers' perspective, can be bureaucracy, delay, and a stifling of creativity. For technical communicators, this tension is felt most acutely when the expression "information management" replaces "communications" in discussions touching on how an organization addresses its people (internally) and its public (externally).

CONTENT MANAGEMENT SYSTEMS AND CONTENT MANAGEMENT SOFTWARE

A Content Management System (CMS), understood as a series of regulated steps taken by an organization to ensure control and integrity of information as it goes from creation to dissemination, is a system that can be tracked and even to some extent automated by software. This software has garnered such attention in the last five years that today when people hear the acronym CMS they assume it refers to a piece of software that tracks, organizes, and distributes information. The typical CMS consists of two parts: a database containing data and metadata and a Web template that controls the "look and feel" of information. From an organizational standpoint, the advantage of having all information presented via a single template or even a suite of related templates is consistency of brand and control over navigation. The advantages of using a database to store information, as opposed to files in a filing cabinet or proprietary software files on a stand-alone PC or even RTF files on a server, is that the separation of form and content can be strictly controlled, which enables information sharing and rapid republication in new formats and different contexts. Database storage of information also simplifies the process of tracking changes to a piece of information, knowing who contributed to its production, knowing how old it is, when it should expire, and how it relates to the other pieces of information in the system.

Perhaps a concrete example will illustrate the points involved here. Imagine a hierarchical organization, like a university, that has myriad semi-independent units functioning semi-autonomously. There are institutional rules for graduation; then there are departmental rules for graduation; and then there may be individual faculty beliefs about the departmental and university requirements for graduation. Given an uncontrolled information environment, a student might enter the information system from any one of several points and assemble an understanding of the requirements that might be different from another student's, who is following the same degree path but came into the information system using a different navigation scheme. One student might have the university rules in mind but no knowledge of the department's specifications, while the other might know the departments' rules but not know how the university regulations supplement them. Add to this the distinct possibility that a faculty member has his or her own ideas about what a student should do before graduating, which may or may not have any direct connection to what is required to achieve graduation, and you have an inefficient information system. So, if the first student looks for the answer to the question of what he needs to graduate by going to the university Web site, he might get one answer; while another student who seeks to answer the same question from a departmental Web site might get another answer; while a third who goes to a faculty Web page might get yet another answer. If there are multiple answers to the same question, confusion is inevitable.

By controlling who can answer what questions on a Web site, content management systems can control the information an organization presents to the world. While content management systems were developed in the days prior to Web-based publication, today a typical CMS consists of a Web browser front end that is accessed by any given knowledge worker through a login screen. Given a user ID and a password, the system decides what that user has authority to edit, contribute to, write, distribute, and publish. The system will alert a user when some piece of information is ready for one or more of these functions, track changes to a piece of information, keep multiple users from editing the same piece of information at the same time, or from including information in contexts where it doesn't belong. The CMS also controls the Web site's navigation, thus controlling access and context for understanding any given piece of information while providing a consistent user experience. The advantage, again from the bureaucratic perspective, is some control over how information from the organization is received and therefore a modicum of control over how it can be interpreted. At very least a CMS can reduce some instances of mixed messages. At the same time it can cull the system of documents that are no longer relevant, supersede antiquated versions, limit access, and maintain consistency of message. Although, to be strictly accurate, no CMS can do this for legacy documents, which still form the overwhelming majority of documents in most businesses and which need to be entered into the system if they are going to benefit. In effect, a CMS provides the electronic equivalent of a company spokesperson, a single

authority in control of the company message, able to stay on message, and invalidate any unauthorized messages. All statements by people other than the spokesperson can thus be considered leaks and disavowed.

HOW WILL CMS AFFECT ORGANIZATIONAL STRUCTURES?

Because it promises such an increased level of control, a CMS is especially attractive to large organizations and even small organizations that generate a great deal of content. One of the consequences of implementing a CMS is that whoever is in charge of it is in charge of the design and distribution of the organizations' message, and thus some shifts in organizational structure may be inevitable.

What shifts may eventually occur in a given organization ultimately depends on what perspective people in that organization take regarding the three critical aspects within any content management context: system, people, and information. A systems-based approach, where content management is seen as systems managing people, will inevitably reflect a technologically deterministic slant and put the system ahead of people. Under such an approach, the features and capabilities of the particular CMS adopted become the focal point of, and often dictate, the organization's content management practice at the cost of the needs of its end users—the technical writers. Unfortunately, if the CMS has major flaws and limitations or is inappropriate for the organization's needs, it will place serious constraints on what the people in the organization will be capable of in managing their information. One of the primary complaints expressed by people who have been told they have to use a CMS is that it is unresponsive to their workflows.

A more technologically critical approach sees content management as people managing content/information. The focal point here is the organizational context, which encompasses its information needs and the needs of the people managing such information. The information needs determine what processes to implement and what system (CMS) to adopt. Such implementation and adoption decisions often come after careful, critical, and deliberate assessment of the capabilities of the CMS and how adequately the software system will be able to meet the organization's information needs and the needs of the people. The end result of such an approach is often more simplified content and a more streamlined process in addition to the reconceptualized approach.

Understanding a CMS and how it impacts an organization, particularly its documentation practice, is easier said than done. As Martin White (2002) has argued, "A CMS is probably the most complex rollout an organization will manage" (2002, p. 22). A project of such complexity dictates a project team of diverse makeup, often consisting of a project manager, IT personnel, authors, editors, and many more, depending on the particular organizational needs and context. Due to such a diverse makeup, content management teams are often

confronted with two major issues: (1) some members may not have "an intimate understanding of the business requirements and problems," as Ray, Ray, and Hall (2001) found in their content management project at Tenix (p. 10); (2) "Very few people are willing to change the way they work in order to make somebody else's life easier," a lesson Mark Baker (2002) learned in his own experience of implementing a CMS. The problem could originate from any sector of the content management team. In a survey of people involved in CMS implementation projects, for example, Victor Lombardi (2004) found that training authors and editors was the second-biggest problem apart from hardware and software issues. In their investigation of the Web-content management project at Gonzaga University, Wayne Powel and Chris Gill (2003) found, not so surprisingly, that "the web manager became a bottleneck in the site's development and was criticized not only for being slow to meet the needs of offices demanding a Web presence but also for not keeping the site current" (p. 44).

A more serious problem in CMS implementation lies in organizations' tendency to neglect end users and their needs. Just as the most important people in a documentation project are product customers who will eventually be using the documentation, the most important people in a CMS implementation project are the content creators—technical writers and editors. As James Robertson (2002) has argued, "Without content creators, there would be no need for a CMS. Yet surprisingly, this user group is often the worst served by a new content management system."

Such an unfortunate state has two implications. One is that the managers put in charge of content management projects are often not content creators themselves and thus are inclined to take a systems-based approach toward content management, overemphasizing system parameters and capabilities and neglecting end users—the technical writers and editors. Another implication is that content management practice is redefining the roles of technical writers and editors. Unfortunately, this redefining does not always result in positive prospects for writers and editors, for reasons we mentioned earlier, and may present serious challenges. For example, a systems-based approach to content management may very well result in a devaluing of technical writers and editors and reduce their roles to those of assembly workers, where they are concerned only with producing discrete information chunks.

CMS AND TECHNICAL COMMUNICATION

For technical communicators and the people who train them, these shifts in organizational structure may be seismic. Whereas for the last 20 years or so professors of technical communication have been incorporating document design, desktop publishing, multimedia, graphics, photography, animation, movies, and Web design into our classrooms as preparation for people who will be entering various industries to become the people who present content to the world, these

functions may well be performed by the CMS and the IT people who administer it. In such an organizational setting, the technical writers will be limited to writing rich text structured information chunks. They will not design documents or create layouts. They will have no control over how text is displayed or how the images or the data that should accompany the text will appear. They will have no control over the context in which their information appears or the uses to which it may be put. In fact, they will have no authority over their information at all. There will in a sense be no author, but rather an authorization process. The knowledge worker in sector seven, section G, cubicle four will have no distinct voice save that of one in a choir. The humanities-based technical communication degree will therefore be either all the more relevant or completely irrelevant, depending on your point of view. But one point is un-debatable: anyone who plans to directly participate in the communications processes of a contemporary organization needs to understand how CMSs work and how they alter the composition and flow of information within a given organization if they hope to do more than produce information chunks.

THE SEPARATION OF FORM AND CONTENT

A significant issue concerning content management systems, and also a major charge brought by critics of automated information management, is the strict separation of form and content. Traditional technical communication courses teach writers to produce documentation that seamlessly integrates form and content. We have taught, or have been taught, that content needs form to be effective and that a writer must consider form and content as simultaneously interrelated in order to design documents with maximum impact. Consider, for example, the following: 4043678940. Is this a sequence of numbers? Is it an area code followed by a phone number? Does its access result in a phone being dialed or a person's profile being printed to a screen? Or does it result in the next 10 digits in the sequence being accessed? For a human being, these questions are answered by visual design cues, data formatted to produce information: (404) 367-8940. Without the formatting, the 10 digits present a dilemma to the user. With the formatting, the dilemma is instantly resolved. Technical communication has concerned itself with the design of information in just this way, integrating form and content to create meaning.

The integration of form and content in this way, however, presents a problem for a database. The parentheses, the spaces, and the hyphen are not integers and thus cannot be stored in a field whose data-type is specified as integer. If we wanted to add these numbers up, we couldn't put them into the database as anything but integers. On the other hand, if we put them in as "varchar," we could keep our formatting. But if our company later decides to print all phone numbers using a different formation, or wants to connect its data warehouse to its voice over IP system and have the computer make the phone calls, we would have to

write a script to access all phone numbers and reformat them. Given the current example, this is not a monumental task. But given a large corporation's infrastructure, getting it done might be absurdly time-consuming, since one would have to involve so many people.

Content management software operates like an interface between the world of data and the world of information. By accessing the data and formatting it according to the stylistic conventions chosen by the designers, it can interpret the data string 4043678940 as a phone number and thus present it as such, (404) 367-8940. In this way, the computer uses form to render data meaningful. The information design decision, that phone numbers should be printed according to a particular widely understood convention, is the purview of whoever designs the content management software and thus, if technical communicators are going to play a part in the CMS process, they need to understand both text and data, and they need to know how to interact with both in such a way that they get called upon to participate when such communications decisions are being made. A technical writer who cannot perceive the value of storing the expression "4043678940" as an integer in a database and insists on the "human" understanding that it is a phone number and therefore meaningless without the conventional formatting phone numbers typically receive (in North America) is positioning himself in opposition to a trend in communications practices that could vastly improve his employability.

CMS software may actually afford technical writers an excellent opportunity for participating in communications at the highest possible levels. In most organizations, the implementation of CMS software has been far from smooth. The systems are expensive, hard to customize, complex to use, and require the kind of careful forethought and planning about enterprisewide communication strategies and workflow practices that cannot be handled by a single group within an organization. A great many people and departments need to be involved in the implementation process if a CMS is going to be successful: designers, programmers, content providers, usability experts, workflow analysts, marketers, brand managers, system engineers, and lawyers; the list can easily exhaust the directory. So many people need to be involved because a CMS is ultimately not about software; it's about communications. Technical communicators, of all people, should understand this, and understanding it, they should be able to position themselves very handily in the implementation process, as long, of course, as they do not come across as wordsmiths.

NEW DEMANDS ON TECHNICAL COMMUNICATORS

The complex nature of content management and content management systems are effecting significant changes in the field of technical communication. To cope with the developing trend of content management approaches, our field has to adapt in several aspects:

- A shift of focus from tools to implementation: Technical communication has traditionally been concerned, at least in part, with making effective use of writing/design tools (mainly software)—understanding the capabilities and limitations of a particular software within a specific documentation-design context. This focus on tools, while helpful to technical communicators within the context of specific documentation tasks, falls short in serving the needs of an organization's overall information management. It must give way to a new focus, one that emphasizes implementation, where the technical communicators, as well as everybody else involved in content management, more critically assess writing/design tools not so much in relation to particular documentation tasks as in relation to overall information needs of the organization. More critical than the question of how a particular tool is going to affect a particular documentation task is the question of how the implementation of tools will affect everyone involved, from the users of the tools, that is, the technical communicators, to the users of information products, that is, the clients. Simply put, technical communicators will need more critical and global perspectives in examining writing/design tools.
- A higher demand for managerial capabilities: The changing and expanding role of technical communicators in content management, as discussed earlier, entails a higher demand for managerial capabilities. Although project management has been part of technical communication curricula, such managerial capacity has been more limited to individual documentation projects. Never have managerial capabilities become such an important asset and been so highlighted as in content management, which demands more global perspectives on the part of the technical communicators in their evaluation of the information needs of their organization, of the tools of information management, and of the implementation of such tools.
- A greater need for collaborative relationships: Since the makeup of a content management team is often diverse and multifaceted, technical communicators are required to collaborate with various groups: managers, programmers, IT specialists, graphic designers, and even subject-matter experts. Working with these groups is no longer an option but rather a requirement. The ability to maneuver among these groups can be key to implementing a most effective content management system.
- A shift from creation of content to its delivery: Technical communication has traditionally emphasized the importance of invention. With the advent of content management and with the datatizing of information at the invention stage, the delivery of this information transformed into a usable and meaningful context at the output stage becomes a more critical aspect in the content management process. The decontextualization at the input stage and the recontextualization at the output stage makes delivery even more important.

- A new set of skills: Finally, with all these new factors affecting technical communication as a result of content management, technical communicators' skills are being redefined. The shift of technical communicators' role from the creator of content to the manager of information, as discussed earlier, entails a new set of skills encompassing such areas as management, programming, graphic design, usability, and information technology in addition to the rhetorical skills of document design.

This list of changes (and the list is obviously not exhaustive) promises a change of revolutionary nature in our conceptualization of technical communication practice: what it is and what it entails. It is no exaggeration to say that content management is forcing us to step outside our familiar boundaries and tread some new yet important territory.

MULTIPLICITY OF VOICES IN THIS COLLECTION

Although content management is not a totally new phenomenon in the field of technical communication, research into this area has been relatively limited in both depth and scope. In editing this collection, we have realized that our field's perspectives on many key issues concerning content management have been far from unified, and that the multiplicity of voices is what makes research into a new area all the more meaningful. In assembling this collection, although we as editors find ourselves not necessarily sharing all the authors' views, we have deliberately allowed multiple voices covering an array of different issues. Nevertheless, we hope that this multiplicity of voices has clearly come through in this collection, and that our thematic organization has made sense in grouping these different voices.

CMS Implementation

Authors in this section move into the more technical sphere of implementation, often relying on their own experiences, while also exploring various parameters that shape or are shaped by CMS implementation. Rudy McDaniel's chapter, for example, outlines the general requirements necessary for Web content management system (WCMS) construction and details a case study in which a specialized WCMS was created using narrative units of information. His case study reveals the ways in which specialized data collections can be represented, stored, and manipulated using common and freely available Internet scripting technologies and XML. Connecting WCMS-related practices to learning opportunities in the humanities classroom, McDaniel outlines a multitiered approach with some sample tasks and activities and provides student samples of CMS-related deliverables produced in his Digital Media course.

In contrast, Carol Johnson and Susan Fowler provide a cautionary voice against rushing to CMS implementation. Using three case studies of location-based, distributed, and expert (tacit) CMS, where CMS implementation is met with varying results, the authors explore what makes a content management system succeed or fail. Based on their analysis, they argue that technical communication practitioners need to learn how to analyze information environments and create systems that respond to the existing knowledge flow.

Finally, Julie Staggers, Meredith Zoetewey, and Michael Pennell examine three content management systems within different university settings. Their focus, however, is on how they, as new members of the junior faculty, struggle to negotiate new identities, new cultures, and new technologies—course management software in particular—in their first academic jobs. Their context-rich narratives depict the complicated overlapping of three problematic elements inherent in new and compulsory CMS: technology, pedagogy, and enculturation. Looking at CMS as more than a tool that can make or break a class, more than another technology choice, they conceptualize it as a potential stumbling block to professional development, especially for new technical communication faculty. The localized yet transferable strategies of coping and resistance they offer might prove helpful to many in similar contexts.

CMS and Technical Communication Pedagogy

A big purpose of our research on content management is to examine ways to integrate the topic of content management into our curriculum and to redesign our technical communication pedagogy to accommodate the changes at the workplace. This is exactly what the authors in this section strive to accomplish. Arguing that instructors should teach students how to analyze the technological situation and then select the most appropriate technical solution just as they teach students rhetorical repertoire, Becky Jo McShane contends that XML is a logical place for technical communicators to locate themselves as experts. She advises that technical communication instructors teach XML as the tool (a particular language) using single sourcing as the theory (a set of principles informing the implementation of a technology), modular writing as the methodology (a practice or way of doing something), and content management as the technology (a generalized set of skills or knowledge).

Exploring the use of open-source CMS, in particular Xoops and Drupal, as course management systems in delivering online graduate courses in professional and technical communication, Michelle Eble applies the classical rhetorical canons of arrangement, style, memory, and delivery in the context of content management. She argues that when we consider CMS, and the online courses/communities they help create, as rhetorical, then arrangement and style become design, memory becomes databases, and delivery becomes distribution.

Lisa Meloncon's chapter goes beyond practical pedagogical issues and constructs a framework using Edward Relph's method of "seeing, thinking, and describing" in combination with his "outsideness and insideness" to explore the use of content management systems as they relate to technical communication pedagogy. She argues that by accessing the CMS through these three lenses, teachers and students will be better able to situate themselves inside or outside the CMS landscape.

CMS and the Profession of Technical Communication

In this section, authors explore various key issues in content management. Robin Evans discusses the relationship between CMS and technical communication and argues that CMS is not a threat to the careers of technical writers but rather an enhancement. Jeffery Bacha, also noting this shift to content management at the workplace, warns of the danger of returning to positivistic, plain-style, and arhetorical technical communication practices. To counter such a threat, Bacha argues, writers will have to increase their ability to produce multiuse technical artifacts and overcome the traditional craftsman approach to document production.

Kirk St. Amant is concerned with the international aspect of content management. He points out that the export of information, or content, to nations with different legal systems creates new and different kinds of problems that must be addressed in the growing information economy. In reviewing practices related to international outsourcing and the content-related problems such practices can cause, St. Amant presents some content management strategies for addressing these problems and examines how such situations can provide opportunity for technical communicators to move into positions of management.

Nicole Amare's chapter focuses on the role of the technical editor as "new author" and explores the issues of authorship and authority within the content management context. Despite some negative consequences that come with this change in authorship, such as the feelings of loss of creativity and invalid restrictions on their writing style, Amare argues that this changing role of technical authorship through tools such as CMS is elevating the technical editor's role in document production, and she sees this as a positive shift.

Lyn Gattis examines the principles of coherence and cohesion and their relevance to the purported nonsequential, nonreferential writing modules in the content management context and seeks to identify means by which information can be easily repurposed and reused but cohesion can still be achieved at a certain level. Also examined by Gattis are issues of cross-cultural communication and the relevancy of contrastive rhetoric research to content management. Her chapter seeks to identify a satisfactory middle ground for repurposing text that is rhetorically and culturally appropriate for readers.

FAR FROM BEING CONCLUSIVE

Content management as a new practice and approach has yet to perfect many of its aspects. Content management systems leave even more to be desired. Even more complicated is CMS implementation (well, at least effective CMS implementation) that adequately serves the information needs of the organization and its users. Furthermore, as we have shown above, each major aspect of content management holds both promises and challenges, in some cases more challenges than promises. Yet as the title of one of the articles in this collection has implied, content management is becoming an inevitable reality, and the technical communication profession will eventually have to "roll with the tide." Research on content management and CMS has been less than abundant, although quality research already does exist. With this collection, we hope to give voice to different perspectives, deepen our understanding of content management, and open doors to new lines of research.

REFERENCES

Baker, M. (2002, November 17). *Structured content: What's in it for writers?* http://www.cmswatch.com/Features/OpinionWatch/FeaturedOpinions/?feature_id=79

Boiko, B. (2005). *Content Management Bible* (2nd ed.). Indianapolis, IN: Wiley Publishing.

Jeffery-Poulter, S. (2003). Creating and producing digital content across multiple platforms. *Journal of Medical Practice, 3*(3), 155-164.

Lombardi, V. (2004, February 9). *Managing the complexity of content management.* http://www.boxes and arrows.com/archives/managing_the_complexity_of_content_management

Powel, W., & Gill, C. (2003). Web content management systems in higher education. *Educause Quarterly, 26*(2), 43-50.

Ray, D., Ray, E., & Hall, W. (2001). Maintenance procedures for a class of warships: Structured authoring and content management. *Technical Communication, 48*(2), 235-247.

Robertson, J. (2002, March 5). *Losing Sight of the Content in a Content Management System.* http://www.steptwo.com.au/papers/kmc_content

White, M. (2002, November/December). *Content management: From vendor selection to successful rollout.* http://www.infotoday.com/online/nov02/white.htm

PART I

CMS Implementation

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CHAPTER ONE

Experiences with Building a Narrative Web Content Management System: Best Practices for Developing Specialized Content Management Systems (and Lessons Learned for the Classroom)

Rudy McDaniel

In this chapter, I begin by examining the process of creating a specialized online content management system (CMS) and conclude by applying the techniques and lessons learned from this experience to classroom pedagogy. Specifically, I consider the development of a Web-based CMS that was created using stories as the raw material for propagating organizational knowledge (a more detailed description of this process is found in McDaniel, 2004). While the theoretical basis for such an effort is an interesting study in its own regard (see Denning, 2001; Post, 2002; Smart, 1999 for studies of storytelling at work in organizations such as the Bank of Canada, the World Bank, and NASA; or Kim (2005) for a discussion of narrative as it applies to the field of technical communication), the issues involved with the construction of such an interface deserve their own unique discussion. In addition, this humanities-friendly data model presents an opportunity for studying the implications of using content-compatible CMS design methodologies in a classroom with advanced writing, communications, or digital media students.

The chapter is organized into three sections. In the first section, I examine the fundamental components of a CMS and present several theoretical considerations for building a specialized CMS. For example, construction of a *narrative* CMS relies on research from organizational and business communication (Denning, 2001, 2004), from cognitive psychology (Bruner, 1991), and from computer

science (Minsky, 1985; Schank, 1990). The process of building a narrative CMS is detailed in terms of a standard software development lifecycle, which begins with an abstract requirements and specification phase and gradually moves toward a more concrete implementation. This process can be adapted to other specialized CMS designs simply by transforming the content base, the encapsulating unit for this content, and the types of design decisions that will eventually be built into an interface. Many of the complex technological processes may require interdisciplinary collaboration from other fields such as information technology, engineering, computer science, or digital media.

I claim that this type of practice-oriented and interdisciplinary synthesis is precisely the type of activity that knowledge management researchers (Hughes, 2002; Wick, 2000) argue is necessary in order to empower technical communicators and situate them in more desirable positions within their organizations. In addition, I assert that writers and digital media specialists are well suited to be operators, administrators, or developers of such systems—that a knowledge and background supplemented with humanities expertise may improve the sterile and positivist pathways and applications of modern content management techniques. This is especially true given the tendency of IT firms to overemphasize technology, to misinterpret (or to wholly ignore) the needs of their audience, and to underemphasize the humanistic components of information applications (see Davenport & Prusak, 1997).

Next, I will detail the practical aspects of constructing CMS technologies and describe some of the decisions that were made during development of my own CMS. In the case of a narrative-based CMS, a system such as the one I discuss can be built using a modicum of student talent, open-source software, and a metadata classification system such as XML. As I discuss the process involved in building my own CMS, I will write about lessons learned from this experience with regard to user privacy; the selection, storage, and classification of relevant information; the use of open-source versus proprietary software; and the decision-making process behind building a genre-specific content management system.

The final portion of the chapter will focus on ideas for teaching by using CMS. My argument is that a thorough understanding of topics such as CMS, XML, and the practices for building such technological systems is essential for the students graduating with technical writing or new media degrees. Incorporating these topics through classroom exercises, readings, and discussions equips students to be better prepared with both the fundamental skills necessary for survival in the industry with the critical thinking skills necessary to truly innovate in the field.

As Zimmerman (2001) writes, it will not be long before autonomous computer agents write their own software documentation. We already have mechanisms in place for computer programming languages such as Java (JavaDoc) and PHP (PHPDoc), but such documentation is rather mechanical at this point and of use mostly only to other programmers and developers. The day in which computer

algorithms begin to write useful instructions for end users is still some time away, but it is likely to be inevitable. When that day comes, the ability to translate core technical skills into other types of innovative ideas and projects will be essential for newly trained technical communicators and new media practitioners entering the workforce. CMS technologies provide a nice starting point for examining these sorts of issues. Their reliance on core Internet technologies, their ability to generate multiuse content for a variety of audiences and contexts, and their compatibility with metadata classification languages are all characteristics that position these complex systems as natively and inherently useful teaching tools for those courses in which the study of complex information is integral.

PART I: LIBRARY (COMPONENTS OF A SPECIALIZED WCMS)

The process of designing, implementing, and managing CMS systems in online environments has been described as Web content management (WCM) (Yu, 2005). We can therefore describe the technologies supporting this task as Web content management systems (WCMS). In its most general form, a WCMS is nothing more than a database-driven Web site. Though some claim such a comparison is a bit oversimplified for CMS in general (see Goans, Leach, & Vogel, 2005), it is certain that the architectural basis for any online CMS generally involves a robust database paired with an interface capable of communicating with this data source. Such a scenario is also common for systems that *do not* rely on the Internet; complex configurations of content are generally only possible through the use of database technologies capable of sorting and shifting information in response to user commands. In a non-networked environment, such commands are simply generated by an interface from workstation application software rather than from a Web browser.

After these basic database and interface technologies have been configured, a WCMS can be customized for a variety of pedagogical and industrial applications, from monitoring and adapting student learning outcomes in fields such as mathematics and writing (Deacon, Jaftha, & Horwitz, 2004) to modularizing content in complex writing scenarios (Farkas, 2005; Goans et al., 2005; Surjanto, Ritter, & Loeser, 2000). A basic premise leading to the success of early WCM systems is the idea that a finite number of efficiently constructed information units, or nodes, can be coupled with database support to dynamically generate a large number of content configurations and documents. This emergent complexity is based on relatively simple changes to the requests made to the database server. The small number of template pages is then much easier to manage and maintain than vast collections of documents with individualized headings, inconsistent content, and stylistic disparities.

A specialized WCMS can be very useful for solving many of the issues encountered in large-scale Web development projects, especially when content is

added in a distributed fashion. As Goans et al. (2005) note, such environments often rely upon multiple authors, each with their own technological backgrounds and ideas about how given content should be represented on the Web. While such stylistic and structural differences are interesting to observe, particularly in terms of emergent properties that may form when multiple authors consider a single topic from different angles, they also lead to serious problems when individual pages are collated and represented under a common organizational framework. A primary problem here is inconsistency, which contributes to an overall "lack of organizational voice and credibility" (Goans et al., 2005, p. 30). The architecture of a WCMS, which imposes a higher-level order and structure upon the data through the use of form fields and data verification tools, often alleviates many of these inconsistency issues. Furthermore, these architectures improve maintenance and administration of the content collection by trimming the number of editable files to a manageable number.

When a CMS system is housed on the Internet—thereby becoming a WCMS—additional server software is needed to manage communications between client and host computers. Using an interface, a Web server, and a database management system, an online content management system provides a dynamic and interactive alternative to information access and retrieval as opposed to traditional and static HTML delivery systems. The core of a general Web-based content management system is configured as shown in Figure 1. In any given transaction, a request for information is first relayed from the interface to the Web server, which sends any database queries on to the database server. Appropriate subsets of information are then returned to the interface, which displays records accordingly and filters information down to what is hopefully an absorbable and manageable level of granularity for the end user. Additional searches or sorts requested by the user will then be executed immediately, either with no additional requests to the two servers (client-side processing) or with additional round-trip visits to one or more servers (server-side processing).

The transformation of the relevancy of digital information as it moves in either direction through this system is worth noting. Using Davenport and Prusak's (1997) distinction between data, information, and knowledge, we see the process

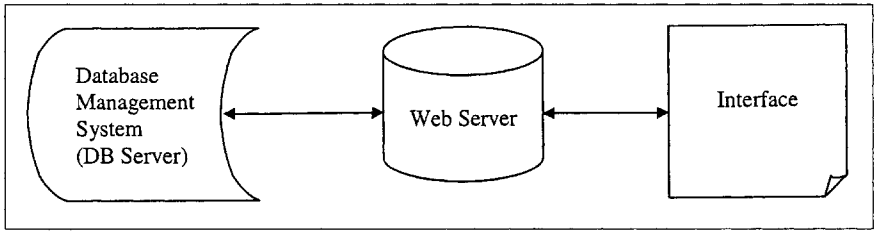

Figure 1. General CMS architecture.

of moving from raw data to usable knowledge as a filtering process, with the most useful, relevant, and appropriate sources representing information that will eventually be internalized and encoded as knowledge. This stored knowledge can then be transformed and adapted as new situations emerge that may require access to the same sorts of cognitively encoded memories and observations in a slightly different context. In Figure 1, assuming that data entry also occurs from within the interface, data primarily flows from the right to the left, starting in the interface and making its way into the database server. Information, though, will flow from the opposite direction, beginning its journey in the database server and eventually filtering through the Web server to arrive in the interface. Assuming that the WCMS is doing its job correctly and that the user has formed appropriate search parameters, the filtering process will be successful in separating data, or world observations, from information, or contextually relevant and useful world observations (Davenport & Prusak, 1997).

Given these three general requirements, it is quite possible for an entire WCMS to be developed and deployed on a single computer. In a testing environment, for example, it is not uncommon for developers to run Web server software, database server software, and programming or interface design software concurrently on a desktop or laptop computer. While a technical discussion of this installation and configuration is beyond the scope of this chapter, the point here is that the tools for constructing and creating a specialized WCMS are readily available and configurable for a wide variety of needs. In addition, many of these robust tools are available for free. Both commercial and open-source tools (see Deacon et al., 2004 or Goans et al., 2005, for a discussion of some of these applications) are available to support configurations of both specialized and general content management systems.

Developing a specialized WCMS, then, primarily involves manipulation of the data situated at either end of this general WCMS architecture. In other words, specialization occurs at both the database level, with the insertion of specialized sets of data appropriate for a given domain, and at the interface level, with the user-centered design of a product that meets the needs of those searching for information within that domain. The Web server, which coordinates the flow of specialized information in both directions, is largely unaffected by specialization. Examples of one such specialization technique—for both database and interface designs—will be discussed in Part II of this chapter.

Given this general architecture, the development of a specialized online CMS is largely concerned with soliciting the appropriate sources of specialized content. We can refer to this database collection as the *library* of the CMS. For example, a CMS concerned with automotive repair needs to gather and store data related to vehicle models and part numbers, service locations, service histories, technician personnel, and other types of data associated with vehicles and their parts. A CMS used by environmentalists for environmental awareness campaigns would instead populate their library with industrial propagation information,