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# Component Content Management: Shaping the Discourse through Innovation Diffusion Research and Reciprocity

Rebekka Andersen  
*University of California, Davis*

Component content management (CCM) is profoundly changing technical communication (TC) work, yet TC scholars have been largely absent from the CCM discourse that is shaping that work. This article explores the notion of reciprocity as a way for scholars to gain agency in the CCM discourse. The author argues that innovation diffusion studies can provide rich opportunities for enacting reciprocity. She offers her own CCM diffusion study to demonstrate the potential value of this model.

Technical communication (TC) practitioners are facing unprecedented change management and information development challenges, particularly in the area of component content management (CCM), which has been called a “paradigm shift” (O’Keefe, 2008; Rockley, 2001) and “seismic shift” (Dicks, 2009; Hackos, 2009) in TC practice. This shift is the move from desktop publishing to object-oriented publishing, which focuses on creating and managing content at a granular level rather than at the document level. Technical communicators practicing CCM create stand-alone pieces of content (such as a procedure or product description) for use in various contexts. These pieces, or objects, each conform to rules defined by standards and schemas, which ensure that the objects are consistently structured and can be assembled into different information products (e.g., catalog page, user guide, online help) rendered in different outputs (e.g., PDF, HTML, compiled help, ePub).

Transitioning from a desktop publishing paradigm to a CCM paradigm is an incredibly costly and complex undertaking for an organization (CMS Watch, 2009; Gu & Pullman, 2009; Hart-Davidson, Bernhardt, McLeod,

Rife, & Grabill, 2008; Jeffrey-Poulter, 2003; Johnson & Fowler, 2009). The transition requires extensive changes within organizations, not only in terms of adopting new tool sets but also in reference to reconceptualizing the business, communication, and information development and management processes on which organizations have long relied.

TC scholars are just beginning to learn how practitioners are making the transition to CCM and what learning challenges the transition presents. Whereas a number of scholars have published on both broad and specific practices of content management (CM; e.g., Pullman and Gu's [2008] special issue of *TCQ* on "Content Management and Technical Communication"), as a field we have yet to closely examine CCM diffusion—the processes by which organizations are moving from first knowledge of CCM to full implementation of CCM. This research gap, coupled with scholars' tendency to publish in academic venues and participate in academic discussions, has resulted in TC research having minimal influence on CCM diffusion. The widely discussed academic-practitioner divide also adds to the dilemma; as numerous scholars have noted, academics and practitioners have historically found little value in and use for the work of the other (Andersen, 2008; Blakeslee & Spilka, 2004; Clark, 2004; Dicks, 2002; Giammona, 2004; Johnson-Eilola & Selber, 2001; Lay, 2004; Robidoux, Overby, & Hewett, 2010; Spilka, 2002; Thralls & Zachry, 2004). With CCM revolutionizing the practice of TC, scholars must find ways to overcome this divide.

In this article, I explore the notion of reciprocity as an opportunity for TC scholars to participate in and to help shape the CCM discourse, now mainly carried on by industry analysts, consultant groups, and software vendors. Reciprocity draws on Miller's (2003) concept of praxis, or "social action" (p. 68). As a research methodology, it positions academic researchers and practitioners in mutually beneficial relationships that can lead to research-based problem solving. For example, in return for access to work-sites, researchers might help practitioners gain a more critical understanding of local problems and develop research-based solutions. I argue that one way scholars might gain agency in the CCM discourse is through reciprocity studies in the area of innovation diffusion, which generally refers to both the process by which a new innovation (such as a practice or technology) is communicated or "diffused" to a target group and the process by which that target group adopts the new innovation (Attewell, 1992; Fichman, 1999; Geroski, 1999; Ortt, 2006; Rogers, 2003; Shampine, 1998). Innovation diffusion research opens the door for scholars to examine how practitioners are approaching CCM initiatives, how they are attempting to integrate CCM methodologies and technologies into local contexts, and what learning challenges they are facing and why. I offer my own CCM diffusion study

as an example of the potential value of using reciprocity to cross the academic-practitioner divide and influence CCM practice.

I begin with an overview of the CCM discourse and why organizations are increasingly adopting CCM methodologies and technologies. After establishing a bigger-picture view of CCM practice and the need for research on CCM diffusion challenges, I describe my study of a technical documentation group that attempted to adopt CCM and my own attempts to participate in and to help shape the CCM discourse. I end with a description of different ways scholars might enact reciprocity to help develop a more critical approach to CCM and to blur the boundaries between research and practice that have long characterized the field.

## COMPONENT CONTENT MANAGEMENT DIFFUSION CHALLENGES

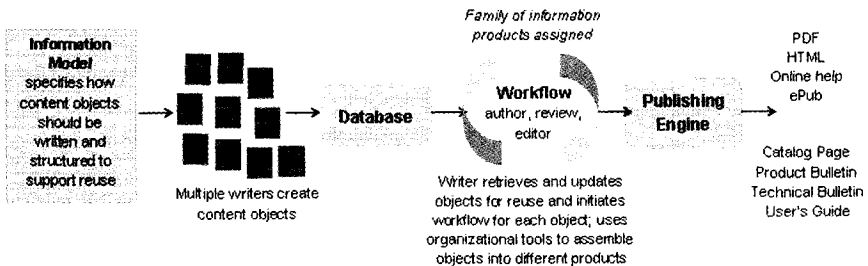
### Sorting out Definitions of Content Management

For years, TC practitioners, consultants, and scholars have been talking about CM in the blogosphere (e.g., Abel, n.d.; Bailie, n.d.; Gollner, n.d.; O'Keefe, n.d.; Rockley, n.d.), in trade books and articles (e.g., Ament, 2003; Boiko, 2004; Fraley, 2003; Hackos, 2007; Rockley, 2002), and in scholarship (e.g., Albers, 2003; Andersen, 2008; Appen & McDaniel, 2009; Clark, 2002, 2008; Dayton & Hopper, 2010; Pullman & Gu, 2009; Sapienza, 2002, 2007; Williams, 2003). But CM has seldom meant the same thing in one discussion as it has in another. CM has been used to refer to Web CM (WCM), document CM (DCM), enterprise CM (ECM), XML-based publishing, single sourcing, and even course management (see Clark [2008] for a useful distinction among these different kinds of CM). The problem is that CM can mean any of these things or all of these things. Talking about CM in general is problematic, as different kinds of CM require different kinds of processes, methodologies, and technologies. Not having unified agreement among practitioners and scholars on the terms and definitions of CM has resulted in inconsistent and often conflicting language to describe what CM is and what transitioning to CM means. It has also resulted in organizations not understanding what kind of CM technologies will best support their goals for CM; this confusion has led many organizations to purchase the wrong CM technologies (Eleder, 2010; Gollner, 2010b; Hackos, 2010b; McNamera, 2010; Rockley & Manning, n.d.; Stachowiak, 2010).

In 2008, the CM industry officially adopted the term CCM to help distinguish the object-oriented publishing paradigm from other kinds of

CM (this adoption was solidified by the *XML & Component Content Management Report 2008* [CMS Watch, 2008]). CCM is now widely used to refer to the object-oriented publishing methodologies (such as structured authoring and single sourcing) and the publishing-oriented, XML-based technologies (often called CCM systems) that support them. Figure 1 illustrates one example of the process of producing information products in a CCM environment.

In CCM environments, technical communicators need an efficient and meaningful way to organize, store, manage, and publish thousands or even millions of content objects (“components”). This process is much more complicated than storing whole documents on file servers or databases. CCM systems (CCMSs) allow them to do this. CCMSs are packages of integrated technologies—XML editors, standards/schemas or DTDs (Document Type Definitions), database platforms, and publishing engines—used to collect, manage, and publish large quantities of content objects; they automate and streamline the “creation, approval, storage, retrieval, versioning, reuse, and delivery of content objects” (Intentional Design, Inc., 2006). Although many organizations successfully single source content objects for reuse without a CCMS, working outside a component-based system can become overwhelming for large quantities of content because each object (e.g., paragraph, title, image) has its own life cycle (owner, version, approval, use) and must be tracked, managed, and easily found by different people in different places at different times.



**FIGURE 1** Process of producing information products in a CCM environment. To create content objects, technical communicators use information models that specify how the objects should be reused and how they must be written and structured to support reuse (Rockley, 2002). Writers then call up from a database the content objects they need to update a family of information products, reusing content that must be shared across the products. They then use organizational tools, such as a Darwin Information Typing Architecture (DITA) information map, and XSLT style sheets, which live in a publishing engine, to render the different products (e.g., catalog page, technical bulletin) in the different outputs (e.g., PDF, HTML) that they need. Ultimately, writing teams not only save time but also improve quality because single-sourced content ensures consistency across product sets.

A range of managerial, economic, and technological forces are behind organizations' growing adoption of CCM methodologies and technologies (particularly CCMSs). Dicks (2009) specifically points to new management trends—such as value added, reengineering, outsourcing, and globalization—and new methodologies—such as distributed work, agile development methods, and Web 2.0 and transparency—as impetuses for organizations' moves to CCM. For example, meeting customers' demands for product and service customizations requires organizations to “develop modularized documentation solutions that can adequately support the multiple configurations of customers' products” (p. 58). Hewett and Robidoux (2010) also recognize the need for organizations to meet changing customer demands. Technological advances such as Web-ready cell phones, they suggested, enable users “to demand information in multiple formats and for a range of media . . . . From Web pages and online help to mobile devices, these [digital] formats present information in short, content-rich chunks” (p. 2). These changing customer demands, coupled with new management trends and technological advances, require organizations to produce quality, consistent content that can be rapidly published in various multimedia outputs. CCM methodologies and technologies allow organizations to do this.

### The Need for a More Critical Approach to CCM

Alongside the growing adoption of CCM has been a high failure rate of CCM initiatives, which has been discussed widely in a number of CCM-focused online communities and practitioner-focused articles and reports. Reasons accounting for the high failure rate, for the most part, have been speculative, but the primary reason that most associate with failed implementations is an overreliance on tools (Bailie, 2007; CMS Watch, 2009; Gu & Pullman, 2009; Hackos, 2010b; Hamer, 2007; Wahl, 2006). The CMS Watch's (2009) *XML & Component Content Management Report 2009*, for example, attributes the high failure rate to premature CCMS selection. CMS Watch suggested, “When companies select CCMS packages before they agree on business objectives and adequately plumb stakeholder needs, the technology inevitably ends up driving the system—the people, the business rules, the editorial processes, even the content itself—rather than the other way around” (p. 355). Many organizations have lost tens or hundreds of thousands of dollars, as well as months or years of invested time and resources, because they did not understand or plan for the considerable business, communication, and process changes that CCM transitions require.

The need for a more critical approach to CCM diffusion was a central theme of the Society for Technical Communication 2010 Summit, the

2010 Content Management Strategies (CMS)/Darwin Information Typing Architecture (DITA) North America Conference, and the 2010 Center for Information-Development Management (CIDM) Best Practices Conference. The need has also been echoed in recent discussions on the CIDM LinkedIn group and Content Wrangler LinkedIn group. In the discussions, consultants, TC managers, and even vendors—those who have experienced firsthand the challenges of transitioning to CCM—have come to agree that CCM adoption must include a cultural change that is about people and processes; technology and content are part of the equation, but they are not the full equation (Eleder, 2010; Gollner, 2010a; Hackos, 2010a; McNamera, 2010; Stachowiak, 2010).

These calls for a more critical view of CCM are good news for TC managers who are struggling to figure out how best to plan for the move to CCM. However, knowing what factors account for a successful move to CCM seldom translates into understanding what those factors look like and ought to look like in local contexts. Too many organizations, as JoAnn Hackos (personal communication, July 15, 2010), Director of the CIDM, has frequently observed, do not know what a critical approach to CCM looks like in practical terms, and they do not know where or how to begin planning such an approach. What we need and what we do not yet have, she has argued, are research-based models and guidelines useful to organizations planning CCM transition projects.

This knowledge gap presents TC scholars an ideal opportunity to add value and to contribute to the CCM discourse. Studies in the area of innovation diffusion, I propose, offer great promise for generating new knowledge about the complex cultural, rhetorical, and technological factors mediating CCM transition projects. To demonstrate this promise, in the next section I describe my study of how one technical documentation group attempted to move to CCM. This study gave me not only rich insight into a CCM transition project but also an opportunity to influence the group's approach to adopting a CCMS and the participating vendor's approach to diffusing its CCMS. I end the section by discussing how, through my attempts to enact reciprocity, this work has been received in the larger CCM discourse.

## CCM DIFFUSION STUDY AND OPPORTUNITIES FOR ENACTING RECIPROCITY

### Background and Research Questions

From May to December 2006, I worked as a technical editing contractor in the technical documentation department of Smith Manufacturing, a

Fortune 500 company that specializes in heating, ventilation, air conditioning, and refrigeration equipment and systems. (To protect the identity of my study participants, all company, personal, and software names have been changed to pseudonyms). At that time, Technical Documentation—which included 11 writers, 2 editors, a Webmaster, and a supervisor—produced all documentation for Smith's products and services. Documentation generally included online help for building management systems; catalog pages, installation instructions, user guides, and product and technical bulletins for all hardware and software; and product updates and safety alerts for field workers and customers.

In September 2006, Technical Documentation signed up to participate in a 3-month trial of a CCMS. The department had been interested in transitioning to CCM for over 6 years, primarily because its desktop publishing environment was no longer meeting its needs for content reuse and consistency, translation, and efficiency in the authoring, review, and publishing process. At the time, no members of the writing team had experience with object-oriented authoring or a CCMS. Further, Technical Documentation did not yet know what kind of business and communication processes were necessary to support CCM, and the department members did not yet know what kind of content strategy would best meet their needs. Being new to the world of CCM, Technical Documentation trusted that the CCMS vendor would guide the department through the necessary steps of developing these processes and defining a strategy that the CCMS could support.

This trust was reasonable because the vendor had promised, as part of the trial, comprehensive training in DITA, a standard that defines an XML architecture; ongoing CCMS training; a sample conversion of technical documentation content to DITA; and weekly meetings to discuss trial progress. The vendor hoped that these support services would enable the trial participants to evaluate the full functionality of the CCMS (an author–review–publish cycle) and to see how the CCMS could help the department achieve its goals for content reuse and process efficiency. With experience using the full functionality of the CCMS, the trial participants had high hopes that, by the end of the trial, they could use the CCMS and the sample DITA content conversion to produce a handful of deliverables for an upcoming product release.

That October I designed an exploratory case study that allowed me to examine the CCM diffusion process as it happened; in exchange for Technical Documentation's and the vendor's full participation in the study, I promised to write a formal report for each company outlining my study findings and offering recommendations.

To gain a complete picture of the rich contextual factors mediating the activity of diffusion, I oriented my study design around Doheny-Farina's

(1992) rhetorical, socially constructed approach to studying technology transfer. His approach recognizes technology transfer, which refers to the processes of both creating and diffusing a new technology, as a series of complex communication events that involve interpretation, negotiation, and adjustment at every stage. I also used Dayton's (2006) hybrid analytical framework for studying IT adoption and use to guide my data collection and analysis. The framework complements Doheny-Farina's approach, blending Rogers's (2003) diffusion of innovations theory (what Dayton referred to as adoption and diffusion theory, or ADT), cultural-historical activity theory (CHAT), and the theory of the social construction of technology (SCOT). ADT offers researchers a framework for examining diffusion as a multistage communication process occurring over time and space. CHAT helps researchers analyze how different components of an activity system interrelate—for example, how artifacts, rules, and division of labor mediate relations between the participants of an activity and the larger community to which the participants belong (Engeström, 1999; Virkkunen & Kuutti, 2000). SCOT, with its focus on how technological artifacts are socially constructed and interpreted, helps researchers examine how and why, over time, the participants in an activity system construct a technology the way they do (Bijker, 1997; Duin & Hansen, 1996; Munir, 2002; Nardi & O'Day, 1999; Orlikowski & Gash, 1994; Pinch & Bijker, 1984; Sarker, 2006).

My case study was guided by the following research questions:

- What characterizes the CCM diffusion process?
- How does the process change over time and why?
- What factors seem to account for that change and why?

## Participants

My study participants included eight Technical Documentation employees, including the supervisor of Technical Documentation, six technical writers, and one technical editor. (I refer to these participants as the "trial work group.") My participants also included five CCMS vendor representatives directly and indirectly involved in the trial; two representatives worked directly with the participants, providing technical and training support throughout the trial, and three had significant influence on the direction of product development. I also invited one expert in planning for and implementing a CCM project to participate. The expert serves as the president of a world-renowned consulting company that specializes in the design and development of CCM solutions and organizational management. During my study, she offered expert insight on the diffusion and adoption of CCM in organizations.



## Methods

To address my research questions and ensure a sound case-study design, I used the following data collection methods, which grew out of Dayton's (2006) hybrid analytical framework:

- Interviews. The trial participants from Technical Documentation participated in individual triweekly (about every 3 weeks), 30-minute interviews conducted in a conference room. The CCMS vendor representatives participated in two or three 1-hour interviews. The CCM expert participated in one 1-hour interview.
- Protocol analysis. Trial participants participated in a 30-minute protocol analysis immediately following their 30-minute interviews. Individual participants logged on to the CCMS and talked through their interactions with the system (e.g., processes, methods of accomplishing tasks, troubleshooting).
- Participant observation. Throughout the trial, I observed and indirectly participated in periodic work group meetings, periodic CCMS training seminars, and weekly conference calls related to the trial.
- Process logs. Trial participants completed a process log during the trial. The log provided the work group a place to record their concerns and questions about the CCMS as well as any problems or successes they experienced while using the system.
- Document collection. I collected all documents related to the trial, including e-mail correspondence, support tickets, training materials, CCMS marketing and trial program materials, technical documents converted to DITA, conference call agendas, and conference call meeting minutes.

## Summary of Study Findings

The CCMS vendor originally intended for the trial to last 3 months; after 6 months of communication breakdowns, technical problems, and lack of progress toward achieving trial goals, Technical Documentation decided to end the trial and not adopt the system. The vendor had spent tens of thousands of dollars on the trial and, in the end, was not able to secure a contract. Though Technical Documentation did not lose a lot of money, they did lose 6 months of invested time and resources; the outcome of these 6 months was frustration and little progress toward understanding how best to transition to CCM.

In the following sections, I highlight three key study findings that exemplify how cultural factors (such as organizational practices, relationships, values, and rules) and rhetorical factors (meaning-making activities, such

as communication events and interactions with the new technology) mediated the diffusion process at every stage. These findings demonstrate some of the challenges that organizations are facing as they move to CCM, and they point to some specific ways that TC scholars might contribute and add value to the CCM discourse. Portions of these findings have already been published in *CIDM Information Management News* (Andersen, 2010a) and the *CIDM Best Practices Newsletter* (Andersen, 2010b). The key findings reported in this article can be summarized as follows:

1. The trial work group could not evaluate the CCMS apart from the cultural context in which the group was an active participant.
2. The CCMS vendor's information transfer approach to diffusion hindered knowledge acquisition and learning.
3. The work group's lack of a strategic plan and know-how impeded the members' progress toward achieving trial goals.

*Finding 1: The trial work group could not evaluate the CCMS apart from the cultural context in which the group was an active participant*

The culture of technical documentation was the trial work group's lens for assigning meaning to the CCMS; thus, the group members could not evaluate the system, the sample DITA conversion of documents, or the vendor apart from the cultural context in which the group was an active participant (see Figure 2). This conclusion can be explained by the fact that, as CHAT and theories of social construction assert, learning is local and situational (Brown & Duguid, 2000; Driskell, 2003; Jaworski, 1996; Kaptelinin & Nardi, 2006; Lave & Wenger, 1991; Russell, 1997; Virkkunen & Kuutti, 2000). People learn through participation in a culture of shared artifacts,

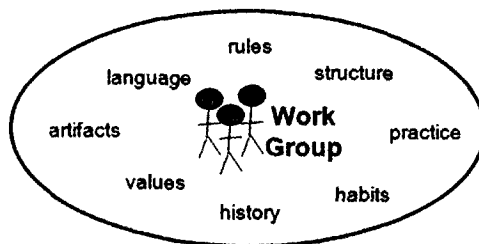


FIGURE 2 Culture of technical documentation mediated the CCMS evaluation process. The work group members could not evaluate the CCMS, the sample DITA conversion of documents, or the vendor apart from the cultural context in which the group was an active participant.

values, rules, and language. Being immersed in this culture, they are continually learning how to be a member of that culture. When learning a new concept, practice, or technology, people gather new information and attempt to make sense of what it means in terms of the culture in which the new knowledge will be put into practice. In essence, each learner's evaluation and interpretation of new information is mediated by the shared artifacts, values, rules, and language of the culture in which the learner is an active participant.

In the case of the trial, the work group's evaluation and interpretation of how well the vendor and the CCMS could meet the department's needs for CCM was mediated by the structure, practices, habits, and ways of thinking of the culture of technical documentation—and its long history and relationship with other departments, subject matter experts, and product managers. Below, I offer two examples of mediating practices that shaped the work group's interpretation of the CCMS.

*Example 1: Concern for reviewers.* The single factor that seemed to influence the work group's attitude toward the CCMS more than any other was the group's perception of how the subject matter expert reviewers would interact with the CCMS and what these reviewers would and would not like about the new review process. Reviewers were known to view their review tasks as secondary to their primary work tasks and tended not to complete their reviews by the deadlines set by the writers. Furthermore, historically, reviewers had been resistant to adopt new review tools and processes, as change meant a time-consuming learning curve and potentially more work. The writers had learned over time that if they wanted to receive useful reviews in a timely manner, they must keep reviewers happy by not complicating the reviewers' work.

Especially problematic was the fact that the reviewers were used to flexibility in how they provided feedback on documents—some reviewers submitted written comments embedded in PDF files and others preferred to submit feedback to writers through e-mails, by phone calls, or on paper. Because some reviewers would review documents during their commute home or even from home, they chose feedback methods that were most efficient for them. The CCMS's built-in reviewing process, however, did not allow for this kind of flexibility; it required all reviewers to access the CCMS to comment on individual DITA topics (content objects). Though the work group members realized the benefits of reviewers seeing each other's comments and of having all comments on a DITA topic attached to that topic, they were concerned that taking away reviewers' flexibility and enforcing a new process for review would cause some reviewers to resist the CCMS.

In addition to not allowing flexibility in how reviewers submitted feedback, the CCMS did not allow for in-text markup, which many reviewers used when reviewing PDF and Microsoft Word files. If reviewers needed to address multiple issues in a DITA topic, they would have to carefully explain in writing where in the topic the edits were needed; they could not simply insert the edits into the topic. The work group members were concerned that this cumbersome process would frustrate the reviewers and complicate the task of reviewing content, a task to which they were already resistant.

No matter how advantageous the review functionality of the CCMS might have been in other technical documentation cultures or how much information the vendor communicated to the work group about the benefits of the built-in review process, the work group could not separate its evaluation of the CCMS review tool from what it perceived as the needs of the reviewer community, a situated perspective that contributed to the communication breakdowns that characterized the trial.

*Example 2: Default configurations.* For the trial, the vendor did not configure each CCMS application interface to meet Technical Documentation's design needs; rather, the vendor transferred default configurations of each application to the work group, assuming that the work group would be able to accomplish its trial goals using the configurations that other vendor customers had found useful. However, because the work group's lens for evaluating the CCMS was the culture in which the group was embedded, the group members found the default configurations to be distracting and confusing as well as a significant departure from existing practice.

Orlikowski and Gash (1994) asserted that

users of new technology tend to approach the new in terms of the old.... In the absence of other information, they will attempt to interpret [new technology] in terms of their existing technological frames, imposing assumptions, knowledge, and expectations about a familiar technology on an unfamiliar one. (p. 191)

As writers, the work group members spent a good deal of their day working with different software, from FrameMaker to Lotus Notes to Microsoft Access. They had become so familiar with these applications that they could accomplish tasks, such as moving files and scheduling meetings, without having to think through goal-directed actions. They had, over time, learned to perform work through what CHAT refers to as unconscious operations

(Bannon, 1997; Kaptelinin & Nardi, 1997; Russell, 1997). Accomplishing work through unconscious operations allowed the group members to focus their time and effort on solving writing problems as opposed to solving technical problems. Because the writers were frequently overwhelmed with writing projects, they appreciated tools that were easy to use and did not disrupt work.

The CCMS default interface configurations, however, were such a departure from the group members' habits of practice that the members could not rely on unconscious operations to perform their goal-directed actions. The configurations included long menus, unfamiliar terms used for familiar actions (e.g., "Audience Email Subject Key" to indicate the subject line for an e-mail), and inconsistent design and terminology between the applications. They also required right-clicking actions to access menus and options and to move files.

Feelings of being devalued in the organization, a history of contentious relationships with reviewers and other departments, explicit rules (such as work flow, review procedures, and authoring guidelines), implicit rules (such as not complicating reviewers' work), habits of practice, and existing tools sets—all of these different components of the culture of technical documentation mediated the work group members' evaluation of the CCMS as well as their communications with each other and with the CCMS vendor. These different components largely accounted for the work group's ultimate perception of the CCMS as too complex and too much of a departure from existing practice.

*Finding 2: CCMS vendor's information transfer approach to diffusion hindered knowledge acquisition and learning*

The trial work group's perceptions of the CCMS and the vendor were largely the result of what proved to be an information transfer model of innovation diffusion, evidenced most in the vendor's use of communication channels and approach to training.

At its most basic level, an information transfer model of innovation diffusion focuses on the one-way transmission of information from source to receiver, often through information technology communication channels, and it is based on an assumption that the meaning transmitted is the meaning received. An information transfer model of innovation diffusion assumes that if new information about an innovation, particularly a new technology, is well written and transmitted with reasonable accuracy from source to receiver, the receiver will be able to successfully apply that information in his or her problem-solving activities. This model, however, has faced criticism from numerous communication and social science experts, as it fails

to account for how individuals come to understand what the transmitted information might mean in terms of the social context in which it is to be used (Brown & Duguid, 2000; Dobrin, 1989; Doheny-Farina, 1992; Rogers, 2003; Williams & Gibson, 1990).

The CCMS vendor spent a great deal of resources and time on the Smith Manufacturing trial in an attempt to help the trial work group members realize the true value of adopting what the vendor referred to as a complete CCM solution. The vendor provided a DITA workshop, a CCMS 3-day training workshop, and a number of Web sessions; communicated frequently with the work group through e-mail and support portal exchanges; and facilitated weekly conference calls. All these communication channels were meant to facilitate knowledge acquisition and shared understandings of terms, processes, problems, and solutions. The vendor's information transfer approach to diffusing the CCMS, however, resulted in trial participants' spending most of their time trying to decipher vendor messages and to figure out what the different CCMS applications meant in terms of day-to-day practice. The trial ultimately ended with the participants' not having a good sense of how the content component authoring, review, and publishing processes enabled through the CCMS would work for Technical Documentation.

Below, I provide two examples of how the vendor's approach to communication and training represented an information transfer model of diffusion and why the model tended to impede rather than open up opportunities for learning and shared understanding.

*Example 1: Limited communication channels.* The vendor put a number of communication channels in place—such as a support portal, e-mail, and weekly conference calls—to facilitate the exchange of messages between trial participants and the CCMS implementation team. The support portal (built into the CCMS) served as a means by which work group members could report technical issues and receive solutions to those issues. E-mail also served as a means by which group members could report progress, problems, and concerns and receive feedback. Weekly conference calls provided an opportunity for more informal, synchronous communication regarding progress toward achieving goals and any problems that arose during the week. The support portal, and to some extent e-mail, allowed the vendor to keep a track record of all problems encountered and solutions proposed. The portal was also intended as a resource for work group members to consult for status updates and feedback on submitted support tickets.

Although these channels had much potential to facilitate communication as an interactive process, they were used more for message transfer than for

sharing knowledge and for coming to a shared understanding of meaning. The channels in place, with the exception of the weekly conference call, lacked interpersonal, synchronous communication affordances. They did not allow for participants to discuss nontechnical questions with the implementation team, who they considered to be experts in use of the system. Further, the channels were not set up to elicit feedback on the CCMS and trial itself; the absence of such a feedback loop silenced many of the work group members' concerns that the vendor might have otherwise negotiated during the trial.

The support portal, which the vendor considered the primary communication channel for the trial and thus encouraged the work group members to use for reporting all problems and for asking questions, proved to be the most limiting communication channel in the diffusion process. The work group members often had questions regarding use of the different CCMS applications to which they needed immediate responses to complete particular tasks. When the members set aside time to work with the CCMS, they expected to be able to complete action items discussed during the weekly conference call. However, the members were constantly running into barriers to completing tasks when they attempted to use the system. Some barriers, such as not being able to locate a just-created PDF file, would prevent the group members from accomplishing what they had set out to accomplish. Instead of calling a vendor representative or sending an instant message for a quick response to their questions, the group members were encouraged by the vendor to submit a support ticket through the support portal. Not only was the submission process time consuming and often frustrating, it was also often followed by a slow response, sometimes a few days and, in one case, a few months.

The portal also limited access to knowledge. Each member could see only his or her open and closed tickets; thus, the members often did not know who had submitted what tickets, what the tickets said, or what the vendor said in response to those tickets. By the end of February, the members had stopped using the support portal to report problems and to ask questions, as it failed to meet their needs for communicating, completing tasks in a timely manner, and sharing knowledge.

The weekly conference calls had the potential to act as a forum for negotiating and for sharing of perspectives, values, language, and knowledge, but because the other communication channels in place for the trial (particularly the support portal and e-mail) were not successful in helping to reduce barriers to understanding, the work group relied on the weekly conference calls to troubleshoot the technical problems that might otherwise have been resolved at different points during the week. By the end of a conference call, little time was left for the vendor to engage the work

group members in dialogue on how they were attempting to measure progress toward achieving goals or what the vendor could do to help facilitate that process.

*Example 2: Instructor-centered approach to training.* As part of the trial, the vendor offered a 3-day CCMS training workshop and periodic Web sessions. The training, however, tended to follow an instructor-centered rather than student-centered approach to learning. The training sessions tended to consist of the expert instructor transmitting information to the novice students—the work group members—through demonstrations and lecture. At different points during the training, the instructor would ask if anyone had any questions; the group members most often would respond with silence or “no,” at which point the instructor would move on. These training sessions seemed to be based on the assumption that the participants, having taken notes and watched the demonstrations, could then perform the tasks covered in the training session on their own. But this turned out to be far from the case.

The work group members had little opportunity to put new information into practice during training, and when they did have such an opportunity through miniexercises, the content with which they were assigned to work and the roles they assumed were unfamiliar; the instructor gave them generic content and default roles to test their understanding of concepts and of how to complete particular tasks. This instructor-centered, information transfer model approach to training gave students a lot of information about the CCMS but little opportunity to develop the know-how to put that “about” knowledge to use. Brown and Duguid (2000) critiqued this method, arguing that know-how does not come through accumulating information but through engaging in the practice in question (p. 126) and through continual negotiation and communication with those who are already in the know.

Without the opportunity to apply their new about knowledge during the training sessions and tap the instructor’s knowledge when questions arose, the work group members tended to leave the CCMS training sessions unsure of how they would apply in practice what they had learned.

The bottom line is that the vendor’s approach to communication and training provided little opportunity for the work group to turn its about knowledge into know-how knowledge. The vendor tended to transmit information to the work group through Web sessions, the support portal, and e-mail exchanges, expecting the work group to then use it for problem solving. The work group members, however, had yet to develop the know-how necessary to make sense of what the information meant in terms of the immediate problems they experienced.



*Finding 3: The work group's lack of a strategic plan and know-how impeded the members' progress toward achieving goals*

The CCMS vendor's information transfer approach to communication proved to be a significant barrier to successfully diffusing their system into Technical Documentation, but so too did the Technical Documentation work group's lack of a strategic plan and know-how. At the time of the CCMS trial, Technical Documentation was not change ready.

The department did not have a change management plan in place for the trial or for its larger CCM initiative. For the trial, the group members had not established processes to guide them in achieving their goals for the trial, and they had not defined priorities and measures, time lines and milestones, or team roles and responsibilities to mediate (or guide) their evaluation of the CCMS. Further, they began the trial without having a content strategy in place and without having worked to develop the information models and metadata strategies necessary to support the restructuring and conversion of existing content as well as development of new content. Complicating this almost certain recipe for a failed CCMS trial, the work group had yet to gain buy-in for CCM from the engineer and product manager reviewers who would be directly impacted by all changes related to the management and review of content.

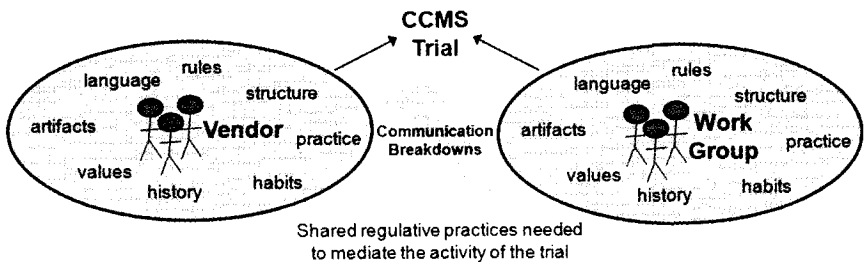
The trial participants began the trial expecting to learn—through their interactions with the converted content in the CCMS—what their strategy for transitioning to CCM and their requirements for a CCMS should be. This overreliance on the tool to guide their CCM initiative, rather than on a strategic plan that included a thorough assessment of the cultural, process, and design changes necessary to support this radical shift, resulted in the participants' not knowing what they should be doing from week to week and not knowing what criteria they should use in evaluating the CCMS, the sample conversion of content, and the vendor itself. The absence of a change management plan, content strategy, and buy-in led to numerous communication breakdowns among the trial participants and between the participants and the vendor.

Although strategic planning would have prevented many of the problems that plagued the trial, such planning would not have prevented all of the problems. Williams and Gibson (1990) noted that when two widely differing cultures work together, cultural and rhetorical barriers need to be overcome if shared goals are to be achieved. For the trial, the vendor was attempting to help the work group perform a successful, useful evaluation of the CCMS. Because the two groups had different levels of expertise and backgrounds; used different vocabularies to talk about the same concepts, tools, and practices; and represented different value systems, organizational

structures, and drivers, they needed common ground on which they could understand each other and successfully communicate meaning (see Figure 3). As CHAT predicts, the groups needed shared regulative practices to reduce barriers to understanding and to facilitate an ongoing, interactive process of idea exchange, negotiation, and learning (Attewell, 1992; Doheny-Farina, 1992; Fichman, 1999; Williams & Gibson, 1990). Shared regulative practices might have included, for example, a collaboratively developed change management plan and CCMS evaluation test plans and meeting agendas.

### Opportunities for Enacting Reciprocity

Cultural and rhetorical factors shaped the CCMS trial at every stage. The vendor assumed that the group members could evaluate the CCMS based on a generic conversion and default configurations, apply to their day-to-day work tasks what they had learned in training, and develop and implement their own measures for assessing their progress toward achieving goals. The vendor relied on the transfer of information through various communication channels to guide the work group through the trial. The work group, however, was seldom able to make sense of the information in the context of their activity system. Further, they did not have regulative practices in place to guide their interactions with the CCMS, each other, or the vendor team. Without a project plan for the trial or a larger business and change management plan for their CCM initiative, the work group members came to rely on the CCMS and vendor team to steer their approach to evaluate the CCMS and prepare for the transition to CCM. The vendor's information transfer model of diffusion and the work group's lack of research and a plan resulted in a diffusion process consisting of the work



**FIGURE 3** Communication breakdowns between competing cultures. The lack of collaboratively developed, shared regulative practices to mediate the activity of the trial resulted in communication breakdowns between the widely differing cultures of the work group and the vendor.

group's playing with the system and constructing it based on the members' fear of what the larger Smith Manufacturing and Technical Documentation communities might think.

Neither the vendor nor the work group anticipated the cultural and rhetorical challenges that mediated all aspects of the trial. My findings suggest that these challenges play a significant role in CCM diffusion, and they may be associated with the high failure rate of CCM initiatives. These challenges, however, have received little attention in the CCM discourse. This gap presents TC scholars, who know a great deal about mediation in goal-directed human activity, an ideal opportunity to contribute research that is useful for problem solving to the CCM discourse.

My particular study serves as an example of how TC scholars might contribute such research. The rich insight that I gained from examining the CCM diffusion process presented to me an opportunity to help the participants in my study as well as the larger CCM community gain a more critical perspective on CCM diffusion. Through my attempts to share my findings with these groups, I have learned that practitioners and consultants are eager to develop mutually beneficial relationships with academic researchers; they are interested in our analysis of problems and data they can use to better understand and address CCM diffusion problems.

### *Enacting Reciprocity within the Study Site*

I designed my study to directly benefit the subjects of my research. In exchange for access to the full trial of the CCMS, I promised to write a comprehensive report for both Technical Documentation and the vendor. In the report for Technical Documentation, I presented my study findings and offered recommendations to the writing team for carrying out the next phase of its CCM transition project. For example, I suggested that the team implement more informal communication channels to increase communication, collaboration, and learning among team members and, ultimately, among all stakeholders in the CCM initiative. In the report for the vendor, I presented my study findings and offered recommendations for improving the process with which the vendor diffuses its CCMS into TC work groups. I encouraged the vendor, for instance, to revamp training to have an increased focus on user roles and day-to-day practice.

After I submitted my report to Technical Documentation, the work group members shared with me their excitement for using the report to plan their strategy for implementing a new CCMS. The vendor, too, shared with me its appreciation for feedback on the different factors that characterized the trial and accounted for the trial's outcome. The company claimed to have learned a number of lessons from my report and has, since then,

revamped its trial program to include more informal communication channels, more upfront planning with work groups, and a stronger emphasis on helping work groups achieve goals through established measures.

In addition to providing the reports, I offered best practices advice throughout the trial and provided resources and resource lists to the work group to help the members better understand and prepare for their transition to CCM. Though I did encourage the work group to develop a more strategic plan to carry out its CCM initiative, I did not provide hands-on guidance. I approached my study from the perspective of a participant-observer. I participated in group meetings and offered suggestions to individual work group members during interviews, but I was careful not to offer advice that I felt would push the trial in a direction it would not have otherwise gone. The participant-observer approach allowed me to watch the diffusion process organically unfold and identify problem areas and questions that researchers in future studies might address. Although there is value in this approach, researchers designing similar studies might consider a research approach that positions them as a consultant—as someone who, while learning about the organizational context and gathering data, examines the needs of CCM stakeholders and offers guidance in planning for and carrying out their CCM initiative. This positioning would enable researchers to enact reciprocity during the CCM diffusion process.

### *Enacting Reciprocity within the Larger CCM Community*

I have published and presented the results of my study in a number of practitioner venues and have been both surprised and excited by the positive response from practitioners. My discussion of findings and their implications for CCM projects have been well received among consultants, software developers and integrators, and technical publication managers, who have expressed a strong interest in seeing more research of this kind. For example, after presenting my study at the 2010 CMS/DITA North America Conference and the 2010 Society for Technical Communication Summit, I received numerous follow-up e-mails from practitioners who wanted to learn more about my research and the theoretical models I had introduced (such as activity theory and the innovation decision process articulated by Rogers [2003]).

My presentation at the CMS/DITA North America Conference also resulted in an invitation to write a short article for the *CIDM Information Management News* e-newsletter (2010a). After the article had generated a lengthy, productive discussion on the CIDM LinkedIn Group, dozens of practitioners wrote, asking to see a more detailed report of my findings,

and that report has now been published as an article in the *CIDM Best Practices* newsletter (2010b), a publication widely circulated to publications managers in the information-development industry. The article has resulted in new contacts with TC managers who are leading their organizations' CCM initiatives and are interested in research that might be of use to them. My presentation with Charlotte Robidoux (Andersen & Robidoux, 2010) at the 2010 CIDM Best Practices Conference, in which we discussed cultural and rhetorical barriers to collaboration and potential solutions, also encouraged professionals to cross the academic-practitioner divide. After the presentation, a number of managers expressed interest in learning more about practical applications of theory.

### CONTRIBUTING NEW KNOWLEDGE TO THE CCM DISCOURSE THROUGH RECIPROCITY

The high number of unsuccessful CCM projects is well known among industry analysts, consultants, and CCMS vendors. Most experts attribute the problems that tend to plague CCM projects to an overreliance on tools—what Pullman and Gu (2008) called a systems-based approach to CM. A critical approach to CCM—one that focuses on CCM as a cultural change about people and processes—is often lacking. Those who have experienced firsthand the challenges of moving to CCM have begun to argue for a more critical approach to CCM and to call for more research-supported models and guidelines to help practitioners understand what such an approach might look like in practical terms. My study offers a glimpse into some of the components that a critical approach might entail, such as guidance for practitioners on developing regulative practices to mediate shared activities between differing cultures. Much work, however, remains to be done.

To help consultants, practitioners, vendors, and academics better understand how TC work groups are approaching CCM initiatives and are attempting to integrate CCM methodologies and technologies into their activity systems, TC scholars might conduct more studies highlighting cultural and rhetorical factors characterizing the diffusion of CCM into organizations. Rhetorical, socially constructed models of technology diffusion, such as those advocated by Dayton (2006) and Doheny-Farina (1992), are particularly useful for examining these factors. The result of CCM diffusion studies that draw on these models can be new, invaluable knowledge that TC scholars can contribute to the CCM discourse as well as to TC scholarship. Those charged with leading CCM initiatives are interested in research that helps them understand what a critical approach to CCM means and

what such an approach looks like in practical terms. Scholars might respond to this need by exploring research questions such as the following:

- What cultural, rhetorical, and technological challenges are work groups transitioning to a CCM paradigm attempting to overcome? What accounts for these challenges?
- What cultural, rhetorical, and technological challenges are CCM software vendors facing as they attempt to diffuse their CCM technologies into organizations? What accounts for these challenges?
- What challenges do both groups face as they attempt to negotiate the different meanings they attribute to the processes, methodologies, and technologies that CCM requires? How might they successfully navigate these challenges?
- As researchers, what roles might we take on in local work contexts as well as the larger CCM discourse to help CCM stakeholders plan for and achieve their CCM adoption and diffusion goals? How might we position ourselves as CCM stakeholders who actively inform and guide practice?
- What cultural, rhetorical, and technological barriers are present when competing activity systems with competing motives share an object of activity? What communication channels, training programs, and mediating artifacts might these widely differing cultures implement to facilitate an ongoing process of idea exchange, negotiation, and learning?

CCM diffusion studies that explore questions such as these open the door for TC scholars to develop a range of best practices resources, as well as to contribute to best practices discussions. Scholars might develop, for example, models and guidelines for transitioning to CCM, such as Andersen and Robidoux's (2010) road map for cultivating a culture of collaboration or Hart-Davidson's (2009) map of technical communicator roles and responsibilities in a CM environment. Scholars might also contribute to popular newsletters such as *CIDM Information Management News*; magazines such as *The Content Wrangler*; discussion forums such as the Google Group "Content Strategy" and the CIDM and Content Wrangler LinkedIn Groups; and the Technical Communication Body of Knowledge Portal, a Society for Technical Communication initiative "to organize, make accessible, and connect together the plethora of information necessary to train for and practice within the profession" (Society for Technical Communication, 2009, p. 9).

Opportunities also exist for improving existing models and guidelines, such as Hackos's Information Process Maturity Model, which has worked well as a consulting tool but, according to Hackos (J. Hackos, personal communication, July 15, 2010), could be refined based on new data and

research-supported perspectives. In addition to contributing models, guidelines, articles, and discussion posts, scholars might also consider connecting with consultants, who often organize best practices conferences such as CIDM CMS/DITA North America, CIDM Best Practices, WritersUA, and Intelligent Content; such conferences offer tremendous networking and collaboration opportunities among academics, practitioners, consultants, and software vendors, and they open the door to potential future research sites.

Scholars might also enact reciprocity through CCM diffusion studies by providing their research participants with best practices documents and recommendation reports. Best practices documents might include tailored change-management plans, assessment tools for analyzing an organization's readiness to move to CCM, sample information models, test plans for evaluating a CCMS, or strategies for developing a style guide for object-oriented authoring. Scholars should ideally work collaboratively with participants to develop such documents so that participants gain valuable know-how. Recommendation reports might include an overview of research findings, a theoretical interpretation of what they mean, and an extensive recommendations section. Because the business world moves at a much faster pace than does academia, scholars need to submit reports soon after their studies conclude, even if this means not having the time to sufficiently theorize. Research participants need to be able to apply recommendations to time-sensitive local problems, after which longer-term theorizing can happen.

Studies that focus on practice areas in need of research-supported models and guidelines also offer TC scholars opportunities for contributing new knowledge to the CCM discourse. In particular, collaboration is an area in need of significant research. CCM environments require a great deal more collaboration than do single-authored text environments (Hackos, 2009; Hewett & Robidoux, 2010; Pullman & Gu, 2008; Spilka, 2009). TC practitioners, who are increasingly working on agile development release cycles, must now collaborate with managers, programmers, Web delivery groups, marketing groups, training groups, subject matter experts, and many other CCM stakeholders. But, as Hewett and Robidoux (2010) argue, these knowledge workers are struggling to collaborate effectively, particularly in virtual environments. Research that examines the role of collaboration in CCM environments—and the interdisciplinary and distributed nature of that collaboration—is needed to inform and improve collaboration practice.

Although the model of reciprocity offered here focuses specifically on CCM diffusion research, other research models that attempt to bridge the academic-practitioner divide might also offer rich opportunities for TC scholars to contribute new knowledge to the CCM discourse. Scholars might explore opportunities for reciprocity, for example, through research

models such as the engaged university (Tebeaux, 2003), corporate-university hybrid (Faber & Johnson-Eilola, 2002), critique-action approach (Rude, 2004), and action research (Blythe, Grabill, & Riley, 2008; Clark, 2004; Faber, 2002; Grabill, 2001).

Now is the time for TC scholars to directly intervene in the processes with which organizations are transitioning to CCM. If we do not take advantage of this opportunity to contribute to the interdisciplinary knowledge construction going on at the practitioner level, our field may miss a golden opportunity to help shape the information development practices that are sure to define TC work for many years.

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**Rebekka Andersen** is an assistant professor in the University Writing Program at the University of California, Davis. Her research focuses on the identity of the field of technical communication and how information communication technologies, particularly CCM technologies, shape that identity.