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EFFECTS OF CONTENT MANAGEMENT ON WRITING IN AN ADMINISTRATIVE OFFICE: BUILDING A WAY OF ORGANIZING WRITING

By

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ABSTRACT

EFFECTS OF CONTENT MANAGEMENT ON WRITING IN AN ADMINISTRATIVE OFFICE: BUILDING A WAY OF ORGANIZING WRITING

By

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Recent research has focused on the need for new writing tools to facilitate knowledge work and the utility of the Content Management System (CMS) for meeting that need. Little, however, is known about the effects introduction of a CMS may cause in the workplace writing environment. This project attempts to answer the question of how content management, existing writing practices, and workplace culture interact. Qualitative research methods are used to study writing practices in an administrative office before and after CMS introduction. Analysis of the results is driven by an activity theory framework and the genre ecology metaphor. This method revealed points of tension between the CMS and the workplace culture; writers' concepts of what writing is and how they do it were challenged. The result is a vision of how content management (CM) and workplace culture are mutually constituted, and how the later can be taken into account when developing technologies to facilitate the former.

ACKNOWLEDGEMENTS

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INTRODUCTION

This project attempted to answer the question of how writing happens in organizations and how the introduction of a content management system (CMS) affected writing practices. To answer this question, I looked closely at the networked nature of writing, focusing on genres as the unit of analysis, and used activity theory to reveal the far-reaching effects changes within writing systems have on established practices. The result is a vision of how content management (CM) and workplace culture are mutually constituted, and how the later can be taken into account when developing technologies to facilitate the former.

The grist of the study is a project undertaken by the Writing in Digital Environments Center[1] (WIDE) in 2008 and 2009. An administrative office[2] (AO) at a large organization asked WIDE to develop a new Web site to improve their communications with stakeholders. There are 10 writers in the AO, representing a number of levels of seniority. They were unhappy with their current Web site, but were unsure as to how to fix it. We recognized both technical and strategic challenges presented by their current Web site and began a qualitative study of their organizational writing practices that lasted more than 14 months and prompted the research, design, and implementation of a custom CMS to manage both web and other modes of writing.

The AO had originally come to WIDE looking for help with a technical problem, that of authoring web pages. In order to address their technical concerns we needed a

1 The Writing in Digital Environments (WIDE) Center is a research center located on the Michigan State University Campus.

2 Details regarding the Administrative Office have been altered.

better understanding of how writing happens in their organization. Similarly, the actions we took in addressing their technical concerns required use to present very real challenges to other values and practices in their office. In addressing their concerns related to the writing of the AO Web site, we began to address and impact the way the organization itself wrote.

In fact, the preponderance of evidence that workplace culture and technology are intimately entwined makes clear the need for explorations of both. This type of inquiry is made especially valuable by the current movement to a post-industrial economy, in which technical communicators' skills have become increasingly valuable. In the post-industrial economy, the work technical communicators do addresses more and more frequently symbolic-analytic (or knowledge) work. As that shift occurs, it becomes more vital that we have tools to facilitate knowledge work. One such tool is CM, and this study offers a close look at how the development and introduction of a CMS affected writing practices among one group of workers.

In this paper, I first argue that developing effective CM tools for writers is vital in the new knowledge-based economy. I then shift the focus to the early stages of the WIDE project that resulted in the development of a CMS for a group of writers in an administrative office. I discuss the process we employed to inform the development of the CMS and detail the features it offers writers in the AO. After the CMS was introduced, I was interested to see how writers reacted to it. I offer a theoretical framework for engaging in that inquiry, and for driving the analysis of data collected using naturalistic methods. I then outline the results of that analysis by offering several

scenarios in which writing practices were altered as a result of the CMS. Finally, I conclude by offering an argument for both the need for writing tools that support modern writing practices and the necessity of taking into account workplace culture when we design and implement those tools.

The work described within was undertaken by a group of WIDE researchers. As a member of that group, much of the work was undertaken by me. I developed the theoretical framework that drove my involvement in the inquiry and this thesis. Similarly, much of the field research, including interview and observation, was conducted by me under the direction of WIDE co-directors. Other events that transpired through the history of this project, however, were driven collectively by the WIDE research group. Regular group meetings played a large role in the formulation of this work, and observation reports by my colleagues provided much needed contrasts to my own conclusions. In my mind, the elements of this project for which I am solely responsible are quite clear from those in which the WIDE research team played the primary role. For this reason, the prose here will be predominately in the first-person singular, but may lapse to plural in instances in which I cannot claim ownership over the thought expressed and actions executed.

Why Content Management Matters

Before beginning an in-depth description of the project WIDE undertook at the AO and my discussion of what that project can teach us about the adoption of CMSs by work groups, I wish to offer an explanation of why such questions require answers. The answer I propose lies with Johnson-Eilola's claim that we are now writing in a post-

industrial economy that values symbolic-analytic work.

Johnson-Eilola (1996) wrote of the post-industrial economy in which the previous emphasis on production by craftsmen has been supplanted by the process-oriented work of knowledge or symbolic-analytic workers. This shift in emphasis from production-based (or industrial) economy to a process-based (or knowledge) economy is critical to understanding the role CM will play in the workplace. The role of mechanical tools as necessary implements in the process of production is analogous to the role of tools for composing, sharing, organizing and storing texts in the knowledge economy. The symbolic-analytic worker is the new metal fabricator and the CMS equally important in our post-industrial economy as the fabricator's dies and stamps were in the industrial economy.

Johnson-Eilola attributes to the symbolic-analytic worker the ability to perform high-level, process-oriented thinking tasks within work units distributed across spatial and temporal boundaries. "Symbolic-analytic workers rely on skills in abstraction, experimentation, collaboration, and system thinking to work with information across a variety of disciplines and markets," he writes (pp. 1-2). In addition, Johnson-Eilola challenges these workers to consider multiple outcomes and contingencies for their work, as the symbolic analytic worker "mediates between the functional necessities of usability and efficiency while not losing sight of the larger rhetorical and social contexts in which users work and live" (pp. 1-2).

Hart-Davidson et al. (2008) found that symbolic analytic work being undertaken across distributed networks often drives organizations to consider new ways to manage

their knowledge assets (or texts). In offering two case studies of how organizations came to CM, the authors found, however, that implementing a CMS involves deeper questions than simply how documents are stored and reused. The authors saw CM initiating a shift in how organizations think about writing and prompting "a discussion of the way they do their work, an explicit need to ask why they exist and what they hope to accomplish" (p. 11).

In this post-industrial economy that Johnson-Eilola describes and in which Hart-Davidson et al. situate CM, CM is more than a technical tool for storing and organizing documents. I argue that it is the reliance on knowledge (symbolic-analytic) work practices to manage information in distributed work environments. It focuses on the processes through which production happens, and their effect on the sustainability of social organizations. With the missions and desired outcomes of organizations now closely entwined with how they manage their knowledge, the ability to develop tools that support the formation and coordination of the textual representations of knowledge is extremely important. The danger of not knowing how writers may react to introduced technologies lies in the potential failure of writing researchers to produce workers with the tools they need to manage knowledge in the post-industrial economy.

With this study, I offer a framework for inquiry that uses ethnomethodological work study methods to gather data and then analyzes that data through an activity theory lens focused at the genre level. Using these methods, my study aims to shed light on how one group of workplace writers writes, and the potential far-reaching effect of changes to their established system.

Writing Systems as Ecologies

I have found the metaphor of writing systems as ecologies useful in considering CM's ability to assist symbolic-analytic workers in their work. In a process-based work environment, the relationship between writers and documents becomes increasingly intimate. Small changes in how ideas are represented textually and organized for later retrieval can have widespread effects on the sustainability of a writing system. Here, I will describe the utility I have found in the writing-system-as-ecology metaphor in order to introduce it as a formative theory behind this study.

The notion of information ecologies is especially salient to our view of writing systems, their mutually constitutive nature, and their relationship to changes from a production to knowledge-oriented economy. Nardi and O'Day (1999) use this metaphor to compare the systems we create to share and manage information to ecosystems studied in the biological sciences. In ecosystems, both biotic and abiotic features enjoy mutually beneficial ongoing relationships with each other. Nardi and O'Day argue that information ecologies are similar, and that facilitating the health of an information ecology requires actively cultivating practices and genres and tending to the natural balance of the system.

Applying an ecology metaphor to writing systems has important implications for those of us developing new technologies to facilitate writing in the workplace. This ecological metaphor may be reductive, but it is useful for underscoring the importance of actively developing methods for managing knowledge sustainably in workplace writing environments. It forces us to consider whether the technologies we develop may be competing for resources with existing tools in the system, may introduce unfamiliar

genres, or trigger any number of other changes that could upset the balance. What I present in this project is an example of how I used a theoretical framework of activity theory and information ecology to drive an ethnomethodology aimed at figuring out how writers write, and how a CM affects their writing practices. I argue that considering these questions can inform the development of future writing technologies that support symbolic-analytic work practices by managing information in distributed work environments.

EARLY RESEARCH & THE CMS

This project dealt with the writing being undertaken in an administrative office (AO) at a large organization. While the grist of the project centered on writing practices surrounding the introduction of a CMS to the AO, knowledge of the project leading up to the introduction of the CMS is important. Prior to unveiling the CMS, the WIDE team researched writing practices in the AO. That research informed the design of the CMS and also provided a snapshot of how the writers wrote before the CMS. That snapshot of earlier practices provides the contrast against the analysis I will later perform on CMS-facilitated writing practices. In this section I will describe the methods we used to research how writing happened in the AO prior to the CMS and then briefly describe the features of the CMS that research resulted in. In doing so, I hope to lay a foundation for the later analysis of the factors influencing adoption of the CMS.

The AO consists of 10 members: a director, five coordinators, one administrative assistant, and three agents (Figure 1). Members of the AO perform a variety of work for the organization including recruitment, marketing, programming, and policy-making. Under the AO umbrella are multiple Web sites devoted to these distinct endeavors. This division of focus means that AO writers bring diverse goals and experiences to web-writing projects.

In early 2008 representatives of the AO came to WIDE and expressed a desire to have a new Web site built for them. A major catalyst in their desire for a new Web site was the difficulty in updating and maintaining the Web site current to them at the time. The AO did not specifically state what they felt was wrong with their current Web site or

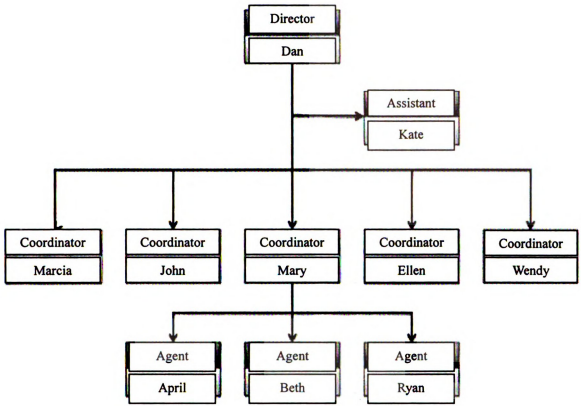

Figure 1. The AO organization structure, for the purpose of this study, consists of 10 members. Additional agents are employed by coordinators but were not active in the AO CMS project. Most AO members also interact with people in departments outside the AO not represented here.

address its shortcomings. They knew it was less than ideal, but didn't know precisely why or to what extent. We recognized immediately the distributed nature of the knowledge work being performed in the AO and identified CM as a potential solution to their concerns about their Web site. We hoped that an effective CMS built for the AO would prove to be a valuable Web site maintenance tool, as well as find utility for managing other writing projects not specific to the web. Before we could help them improve their Web site, we would have to determine exactly what kinds of writing they were doing and how it was flowing from origination to browser windows.

Discovering the Writing System

In order to build a new online communication tool, we first needed to gain a better understanding of how writing was being done in the office and what routes it was taking to the web. This project took place between January 2008 and April 2009, with work broken into three phases: early research that would inform development of the CMS, the CMS development stage, and an evaluation of the effects of introducing the CMS to the writing system (Figure 2). This section addresses the first stage, in which we employed three tools: a content audit, personal interviews, and group meetings. In this fashion, we were able to gain a clearer picture of the activities within the office.

Content Audit

The content audit was performed by two undergraduate researchers and one graduate researcher. A content audit offered us a way to compile a list of all the types of content on the Web site (Rockley, 2002; Hart-Davidson et al., 2008). We attempted to

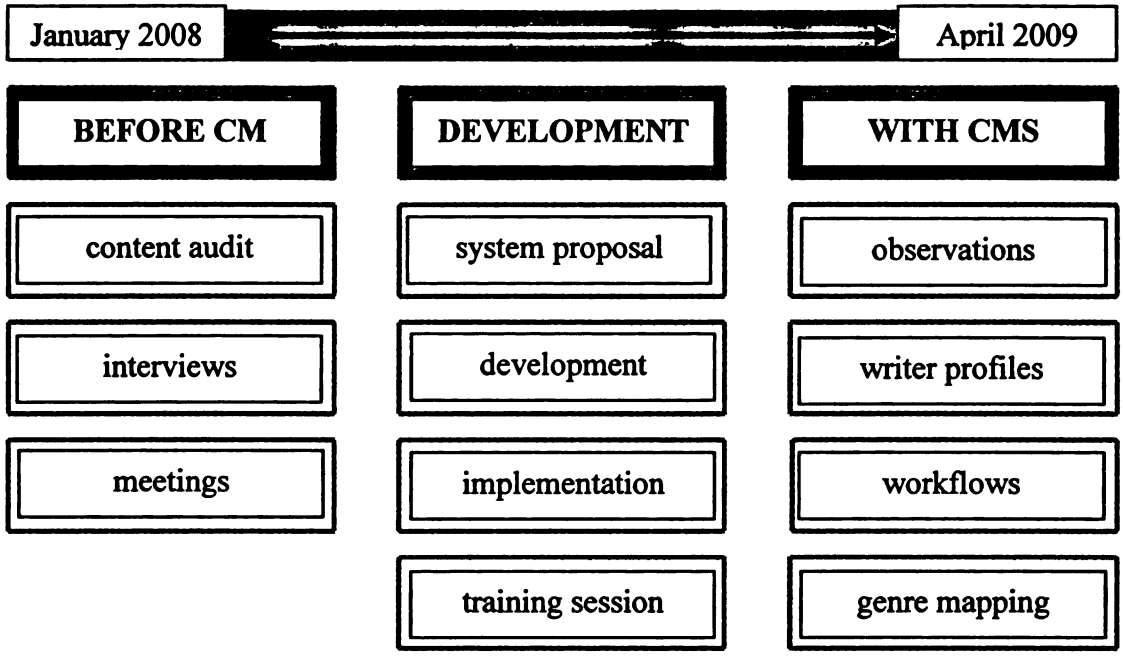

Figure 2. Three project phases occurred between January 2008 and April 2009. The first focused on identifying existing writing practices within the AO in order to inform the design of an effective writing tool. The tool, a CMS, was developed in the second stage. The third stage of the project focused on how writers adopted the CMS, and how it affected their writing.

answer the questions who, what, when, where, why, and how for each piece of web content we found. What resulted was a full reckoning of the content on the AO Web site. As the analysis progressed, specific audiences and types of content were also identified and recorded for each piece of writing on the Web site. Initially, 22 pieces of writing were found on the AO Web site. These pieces of writing included program descriptions, calendar announcements, lists of contact information, policy documents, and other genres.

In performing the content audit we made several decisions aimed at determining precisely what the bounds of the AO Web site were. For example, two writers within the office had unique programming initiatives. Information about these initiatives was written within the office, but posted online under different URL addresses. Initially, we treated these sites as separate from the AO Web site, but later determined that content for them was created within the AO writing environment and that the AO writers viewed them as semi- rather than wholly-autonomous entities under the AO umbrella. Originally, it was determined these sub-sites would not included in the content audit. However, it was later determined that they would be served by the new CMS we created for the Office. Similarly, we faced the question of how to address portable document format (PDF) files. Much of the content on the AO Web site was available only as PDF downloads within the Web site, elements which are often treated not as web pages but as print-destined documents. We decided to include PDFs in the content audit, a choice that later spurred several features of the completed CMS.

From the content audit, several things became clear. Because multiple pages

contained similar information, such as contact information of program summaries, we determined that there was an opportunity for single sourcing within the office. It was apparent that there was little oversight regarding Web site structure. The same content was available on different pages with different names, and some pages had names at odds with their content, such as a catalog of contact information titled, "About Us." The content audit proved to be an effective tool for establishing a baseline from which to assess the content management needs of the AO.

Taking a thorough account of the existing content afforded us two important tools. Firstly, we were able to ask writers about the documents already on their Web site in order to learn more about how those documents had been composed (these types of questions played a vital role in the development of the workflows and user roles that drove the CMS we eventually developed). Secondly, the content audit allowed us to gain a better picture of what types of documents the AO produced, and how they might be better organized for both online publication and organizational reuse. For these reasons, the content audit was an important step in our initial research of what the AO was writing, how they were writing it, and who was doing the writing.

Personal Interviews

Following writing through the system also involved a close look at precisely where changes were being made and files were being stored. In the months following the content audit, we met with writers to talk about their writing practices and experiences with the current Web site. Each meeting was attended by 2 WIDE researchers, lasted approximately 1 hour, and was a mix of directed questioning and open discussion. A

typical question we asked writers was, "Walk me through your process of writing something for the web." These interviews were open-ended, often resulting in long discussions about the kind of work the writers do, and sometimes, the office politics involved in completing that work. The content audit had given us a familiarity with the products the office offered on the Web site, but the interviews were helpful for getting a better picture of how the writers create that content, both individually and collaboratively.

Group Meetings

We twice met with AO writers as a group during the initial research period. The first meeting followed our content audit. We presented our findings from the content audit, asking them to verify our impressions of their practices. We also selected documents from the Web site and asked them to talk us through the composition of those documents. These conversations led us to additional questions about issues such as interdepartmental collaborations and about specific issues of job duties and accountability within the office.

Following this meeting, we developed a systems proposal (Appendix A) and reconvened with the group as a whole to discuss our plans for the new Web site. In this meeting, we made the argument for a CMS that mirrored their existing writing practices. We also said that this tool would have utility for general office writing, not just web composition.

The Existing System

Following the completion of several meetings and interviews with individuals in

the AO we shared our notes with one another among the WIDE team. When reviewing the notes individually we looked for themes, ideas, issues, and practices that were patterned and interesting. We used the structure of people, places, and things as a reading tool, looking at the tools people were using, the environments in which they were writing, and the social connections they shared with other writers. Our goal at this stage was to develop as clear a picture of the existing writing system as we could, in order to recommend a new system that mirrored it.

Prior to introduction of the CMS, the AO engaged in an ad-hoc collaborative writing environment, sometimes not recognizing it as such. Primary authorship was generally assigned, but documents were often informed by several writers, edited by others, and reviewed and approved by more (Figure 3). The system had been developed out of trial and error and had been effective for the purposes of the AO until the point at which the AO asked WIDE for assistance with their Web site.

Most content on the AO Web site could be identified by a primary author. However, much of that content was repurposed from original published documents from within and without the AO. The writing on the AO Web site often appeared in other forms both online and in print, such as brochures, catalogues, and reports.

The previous AO writing system was revision-oriented, with writers and editors moving documents through several iterations. Writing often would be directed to several different audiences, or fine-tuned by multiple writers for inclusion in varied media. Stylistic changes were common as writers moved text from their native format to other formats, such as content written for a webpage being repurposed for inclusion in a

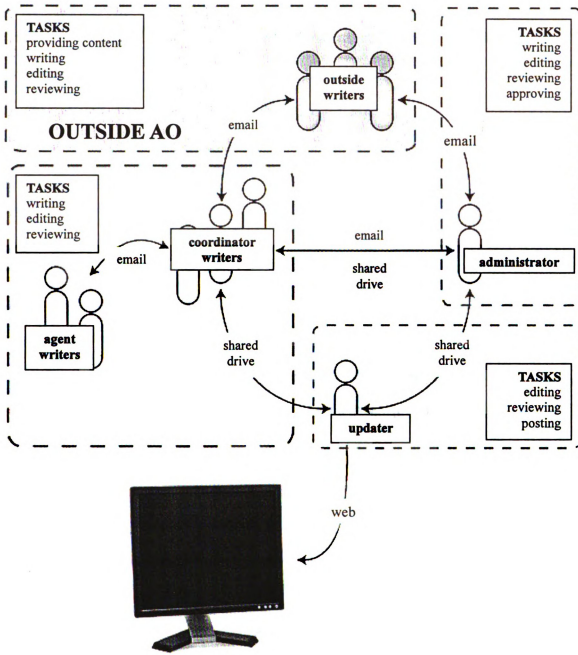

Figure 3. The previous AO writing system. Participants in the system played roles and performed tasks. In the figure, roles are identified within the yellow participant icons and the tasks they perform are listed within each dashed rectangle. The technology by which materials are most commonly shared between roles is labeled along the workflow arrows.

brochure. These activities always involved multiple writers and software, with texts transmitted through shared drives or email attachments and then edited in word processors, page layout tools, photo editing programs, and web editors. These moments of revision also often moved outside of the AO environment. People in other offices, departments, and programs within the AO's organization might be called upon to act as reviewers for a document.

Before being published to the AO Web site, documents were reviewed and approved by the administrator. This review may have resulted in the return of the document to a writer for further revision or approval to publish the document to the Web site. Once approval was granted the document moved from the administrator to the administrative assistant, who posted the document to the Web site using Adobe Contribute. The administrative assistant was tasked with posting the majority of the content on the AO Web site, regardless of who authored the content. The Administrative assistant's abilities were limited to editing existing content and posting new content only, however. The power to make changes to the Web site structure, such as changing top-level navigation, remained with the Web site developer, an outside communications unit that exacted a charge for all but the smallest changes to the AO Web site.

Our research indicated that materials written within the AO had a wide audience. The primary target audiences were current and potential members of the organization and the organization's administrative group. The majority of content on the Web site addressed organization administrators. The AO had expressed an interest in using the Web site to speak more directly to members, particularly in ways that motivated members

to embody the mission of the organization. Additionally, they wished to address indirectly an external audience of pubic officials and media representatives. They believed a more robust web presence would help them reach this audience.

Limitations of the Existing System

The previous system had been meeting many of the needs within the AO. There were notable shortcomings, though, especially for an organization looking to expand its digital communications efforts. Through our initial research, we identified several points at which a CMS had the opportunity to streamline writing within the AO without drastically changing their current practices.

1. The posting phase was a bottleneck in the process because only one person performed the function.
2. There was a cost associated with making many changes to the Web site.
3. The use both of email and shared drives to share document revisions between writers and editors made revisions difficult to track and content difficult to reuse.

Another limitation of the system surrounded the use of similar documents, and of identical information being printed in multiple venues. While it is common and often advantageous for content to appear in multiple artifacts within a writing system, the ad hoc nature with which writing occurred in the AO meant that these similar documents were not grouped together in any fashion and there was no record of their relationship. For instance, when Ellen receives an application for a proposed seminar topic, she enters the data on the application into a spreadsheet, forwards the application to another office

to be included in program descriptions, and then reuses portions of the application in the creation of promotional materials for the seminar. It is Ellen's responsibility to recognize the potential for the document to be reused by future writers, to communicate that utility to them explicitly, and to make the document physically available to them. Our discussions with writers suggest they rarely consider their work to be of use to other writers, and so opportunities for efficient single-sourcing likely are sometimes missed. For an office that repeats similar information in a variety of different documents, this is a notable opportunity for increased productivity.

We noted that all interviewees engaged in collaborative writing, although most did not recognize it as such. Primary authorship is usually claimed by an originating writer, but these same documents are often informed by source material by other writers, edited and revised by others, and reviewed and approved by others. In some cases as many as five writers would take substantive action on a document, but authorship generally resided with the originating writer. Originating writers would send drafts out to be reviewed and revised by their co-workers, who would return new versions as MSWord documents heavily annotated with track changes and commenting. Despite their clear role as composers here, though, they would be considered reviewers rather than authors and responsibility for the document would rest with the originating author. Our research did not suggest whether the attribution of authorship to solely the originating author was due to a technological limitation or a cultural norm within the AO.

Our key findings following the initial research phase included:

1. The proposed system meets many needs within the AO. Shortcomings include

ability to change style of pages and lack of functions to facilitate the AO commitment to enhancing member's experiences in the organization.

2. Most current writing practices are ad hoc and undertaken independently; materials from one process are not shared with another. Writers, roles, and documents are clearly delineated. The system has potential to connect these writers, roles, and documents by systematizing process.
3. Designing the system to recognize writers, roles, and document types and to systematize their work can automate the process of parsing and redistributing documents for differing audiences.

We used this knowledge of how the existing writing system worked and its limitations to develop a conceptual design report (Appendix B) that informed the development of the CMS.

CMS Concept and Capabilities

After taking a full account of the existing writing system including its content, strengths, and shortcomings, we set out to develop the framework for a system that would accurately replicate those practices while streamlining workflows and providing a robust system for managing written texts and other content. We knew that, along with addressing a wide audience, the AO collaborated heavily in writing with members of other offices in the Organization. These collaborations were characterized by use of a wide range of technologies, content types, and workflow processes. Most of these practices seem to have been developed in an ad hoc fashion and seem effective. However,

we recognized the potential for CM to streamline these collaborative writing processes without requiring a drastic change in the practices that worked for writers.

Writing Roles

The backbone of our system recommendation was built on the writer roles we identified in the initial research phase. By building specific roles into the CMS, we could direct what types of actions each writer could take, and direct the system to prompt writers with appropriate next actions based upon their roles. For instance, when composing, writers could be offered a different set of functions than when they are preparing to publish a document to the web. We identified the roles below, and then used them to inform both database and interface designs.

The Writer may solicit source material, draft documents, and manage review and revisions. Writers within the AO are responsible for content strategy and planning for specific content areas, and delegate some work duties to student employees. Writer actions include: planning and executing writing strategies, delegating writing duties, drafting documents, and revising documents.

The Administrator reviews all documents written in the AO and either returns them to the writer for revision or marks them as approved for publishing. Administrator actions include making minor revisions to documents, suggesting major revisions to documents, and approving documents for publishing.

The Updater role may be played by any of the people who perform other roles above, or by an additional person. The updater makes the final decision to post material to the AO Web site, after thorough proofreading. This role may be played by someone

already fulfilling one of the above roles, or by an additional party. The updater's actions may include: revising documents, publishing documents to the Web site, and proofreading.

The Webmaster is tasked with the behind-the-curtain maintenance of the Web site, assigning privileges to writers (as directed by the Administrator), creating new web spaces, and styling the aesthetic qualities of each page. Updaters may publish content to the web, but they may not effect changes to how web pages appear, or who administers approval. These actions are executed by the webmaster. Webmaster actions may include: creating new web page, applying aesthetic skins, assigning user privileges.

The first three roles above existed in some form in the original writing system. The Webmaster role was a new role created to facilitate maintenance of the CMS. It is important to note that each writer in the AO may fulfill multiple roles; roles are more closely allied to the activities writers engage in than to specific writers. For instance, one writer might compose content as a writer, but approve that same content as an administrator. The roles are more closely tied to points in workflow than to actual workers; however, the assignment of privileges limits access to certain roles by certain workers.

Concept for the CMS

We planned to bring all contributors to the AO Web site under the same technology: a custom CMS that allows for easy, collaborative contributions to the Web site by members of the staff. Previously, AO web pages were updated by Kate, the

administrative assistant using Contribute, though the content may come from any number of other staff members. Given that the AO Web site was growing, we anticipated that content needs and writing roles would grow as well. We planned for the new CMS to facilitate work already being done by human actors in the AO, allowing AO staff to manage established workflows and clarify currently ill-defined roles.

Figure 4 is a conceptual diagram that aimed to help the development team plan an effective software design. It places actions, which may be executed by human or non-human actors, into a gray stream that flows between both actors and artifacts. For instance, a writer creates a document, which is okayed by a reviewer, and then assigned a content type and managed accordingly by the CMS on its way to becoming a published web page. It is important to note here that the CMS is not simply a device for storing data, but rather is treated as a non-human actor more akin to writers than to traditional office software. This concept of the CMS as participant in the writing system played a large role both in our design of the system and research of its acceptance following introduction. We designed the system to provide an easy and intuitive way for users to engage in web writing work such as maintaining pages on the site, adding new content, updating existing content. As figures 3 and 4 demonstrate, the writing work of the AO, like many organizations of its type, is marked by the interaction of writing roles, workflows, and mediating technologies.

We determined that the system needed to provide a way to keep track of different types of documents, groups of writers, and sensitivities of time within one interface. As social networking systems are adept at addressing these characteristics, we planned an

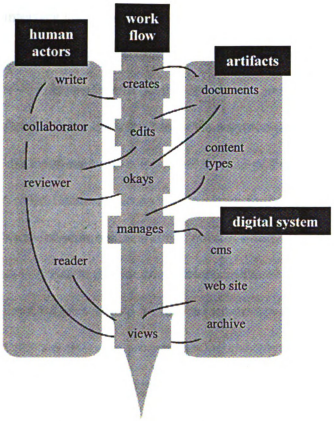

Figure 4. A conceptual diagram that aimed to help the development team plan an effective software design. It places actions, which may be executed by human or non-human actors, into a gray stream that flows between both actors and artifacts. For instance, a writer creates a document, which is okayed by a reviewer, and then assigned a content type and managed accordingly by the CMS on its way to becoming a published web page. It is important to note here that the CMS is not simply a device for storing data, but rather is treated as a non-human actor more akin to writers than to traditional office software.

interface and functionality for the CMS that shares similarities with such sites.

Functional requirements identified for the CMS included:

1. Users should be able to submit content to the Web site using one technology.
2. Users should be able to categorize content submissions by document type. The system will allow staff to manage the workflow for each document type.
3. Users should be able to attach longevity characteristics—such as how long a document should be "public"—to each document and the system will archive or delete the document accordingly.
4. Users should be able to join groups of other writers with whom they frequently collaborate on specific document types, providing a place to store and discuss documents in progress.
5. Users should be able to reuse document formats and content when it is necessary and advantageous to do so.

Development

After completing the conceptual design report, the development team set out to create the CMS. The database design was largely informed by the contents of the Conceptual Design Report, but further information was needed to facilitate decisions of both interface design and single sourcing.

Development of the CMS was completed in two stages. A beta version that managed content but did not enable web publishing was released to the AO first, while the web publishing functions were enabled several months later. The introduction of the beta version marked the beginning of our interest in how writers would use this system,

and how it might affect the writing they do. We unveiled the CMS to a select number of AO writers in October 2008 in a training session at the WIDE Center and provided them with help documentation (Appendix C) introducing the basic functions of the CMS. Access to the CMS in their own workplace was opened approximately two weeks later. At that time the focus of the project changed again, and I began observing the writers work to determine how the CMS affected their writing practices.

In the next section, I will describe the methodology I employed to guide my analysis of the data I collected through these interviews and observations.

METHODOLOGY

This project sought to answer the question of how writers in the AO write as well as how the introduction of a CMS affected their writing practices. Researchers have used workplace studies to address this first question in the past, but inquiries into the effects introduced technologies have on established writing systems are not comprehensive. I intend to address this shortcoming by looking closely at the networked nature of writing in even a small unit like the AO, focusing on genres as the unit of inquiry, and leveraging Activity theory to reveal the far-reaching effects changes within the system have on the established practices.

Why Content Management Matters

The AO came to us asking for a Web site. By recommending a CM project for them, we were knowingly moving beyond traditional Web site development. We were inviting them to explicitly consider the writing practices they have been relying upon, to view published documents not as finished projects but as potential pieces for reuse, and to challenge the lines they draw between writing bound for the web and writing that lives on a printed page.

The persistent and tentacular nature of CM has been discussed previously. The ability of the CMS to facilitate web writing has been addressed (Boiko, 2004), as has its utility for single sourcing (Rockley, 2001). Others have demonstrated that CM can be used to manage knowledge within organizations whether that knowledge is recorded as web writing or other non-web and sometimes unrecognized media (Rockley, 2002; Honkaranta, 2003). Further, the implementation of CM has been shown to prompt large

scale questions about organizational goals and practices (Hart-Davidson et al., 2008). Taking a practitioner approach to CM, Pennington (2007) detailed the design of a CMS for a private software company, making recommendations for a successful implementation, but not describing the reception of the system she designed. Others have looked at the role of memory and recall in CMSs (Whittemore, 2008) and at how writers organize their work in the distributed environments in which CMSs prove most useful (Slattery, 2007). The effects of CMS introduction on existing writing practices have not been the focus of a workplace study, though. By doing so, we hope to shed some light on how CM interacts with existing writing practices and the workplace culture that shapes them.

Traditional notions of culture often surround ethnicity, religion and geopolitical boundaries while in the language of cultural rhetorics the word is tied to identity formation, resistance movements, boundary crossings and otherness. These ideas may all play a role in how writing happens in a workplace, but when, in discussing this study, I speak of workplace culture, I am referring to the values, expectations, and practices shared by a group of writers in a workplace community. The influence that workplace culture may exert on how work gets done may go beyond, I believe, what can be uncovered through considerations of context alone. Likewise, what a culturally-driven study reveals about workplace writing practices can be used to affect changes more widespread than policy and technology. In fact, a study that takes into account the workplace culture can ask serious questions about not only how, but also why organizations write.

These questions are extremely important to consider. They are prompted not simply by a need to increase efficiency in the workplace, but by a movement towards a knowledge- rather than production-based economy. The digital age has seen, for the first time since the industrial revolution, a drastic change in the emphasis of the economy. Where production of material goods once enjoyed the economic spotlight, the ability to perform knowledge work across distributed networks now signifies the strength of the western economy. Performing this type of work relies upon smart methods by which to manage knowledge. In response to that need, this study seeks to widen our knowledge of how writing happens in the workplace, especially when new technologies are introduced.

Theoretical Background

This study concerns how workplace writing is affected by the introduction of a CMS. I draw from a number of fields in order to build a foundation upon which to conduct this exploration. The major bodies of work upon which I rely for theoretical background include: genre studies, workplace studies, contextual inquiry, activity theory, and the metaphor of genre systems as ecologies (Figure 5). Together, these bodies of earlier work allow me to ask, "how does introducing a new tool affect writers and their work?"

Genre and Social Constructs

The AO CMS project was guided by several theoretical perspectives. The most foundational of these perspectives resides with the notion of genre. One view of genre accepted by scholars is that of genre as a rhetorical tool community members adopt in

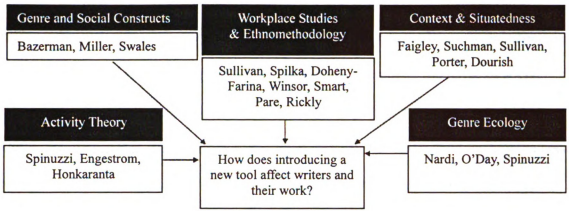

Figure 5. The framework guiding this research draws from five major bodies of previous work.

order to facilitate cooperative action (Bazerman, 1988; Miller, 1984; Swales, 1990). Miller (1984) specifically says genre is "typified rhetorical actions based in recurrent situations" (p. 159). Bazerman (1994) notes that genres, "embody the range of social intention toward which one may orient one's energies" (p. 82) and Bazerman and Prior (2003) couple genre to theories of activity when they say, "to understand writing we need to explore the practices that people engage in to produce texts as well as the ways that writing practices gain their meanings and functions as dynamic elements of specific cultural settings" (p. 2).

The result removes genre from the physicality of textual representation, making it a social phenomenon. Similarly, Bakhtin (1982) imparts on genre the added responsibility of embodying a belief system, suggesting that an adequate exploration of the genre-based writing practice will be concerned with the social constructs directing writers' actions. Building on the concept of genre as multi-dimensional tool used in response to social exigencies, Pare and Smart (1994) offer a definition that traces genre across four dimensions: texts, composing processes, reading practices, and social roles of readers and writers. They also caution that traditional notions of genre may need to be relaxed to prove useful in workplace studies, as genres imply "stable social activities" when workplace writing is rarely static (p. 151). By acknowledging the social roles of writers as a component of genre equal to the texts themselves, Pare and Smart underscore the increasingly phenomenological nature of discussions of genre. As we examined the writing that emerges from the AO, these modes of genre as both typified action and social construct guided our thinking about how writing is done in the AO, and how the CMS

changed those processes.

Workplace Studies and Ethnomethodology

While these theories of genre succeed in agreeing on the socially relevant and informed nature of genres, they don't instinctively offer recognition of this connection a utility in the workplace. In the case of the WIDE AO project, because we were working in a workplace environment, labeling the result of our efforts a "workplace study" made sense. More importantly, methodologically, the qualitative ethnomethodological (or "naturalistic") approach of workplace studies has been shown to be ideal for answering the kinds of open-ended questions we are asking.

Sullivan and Spilka (1992) write that "qualitative research does not refer to a single method, approach to analysis, or philosophy." It is sometimes called "qualitative," "field," "naturalistic," "case study," "ethnographic," "focus group," or "descriptive" research. More importantly for this discussion, though, they identify the types of research questions qualitative studies are well-equipped to answer. This includes: interpreting situations, exploring situations, developing a unique research perspective, and discovering a better way to communicate (p. 594).

Such abilities made a qualitative study a clear choice for answering our open-ended research questions about how writers in the AO write. In fact, Cross (1994) cautions qualitative researchers not to enter such studies hoping to prove or disprove distinct hypotheses. These types of research, he says, are rather better for developing highly focused views of activities. "What results from participant observation is thick description, a meticulous record of observed processes that includes both the subjects'

and the ethnographer's explanations of those processes" (p. 123).

Doheny-Farina (1986) used field notes, tape-recorded meetings, open-ended interviews and discourse-based interviews to create that kind of thick description. He found that writing even small chunks of texts could involve complex organizational processes. In one example of a struggle between executives at a software company, he observed groups of writers working on the same document but experiencing and embracing very different motivations. Both groups appreciated the need for the document to speak to the financial crisis, but the one wished it to focus on unfavorable production numbers, while the other believed it should address suspected financial miss-management. The end result was a delayed written response to the crisis as executives argued.

> A close analysis of the October 13 meeting shows that the goal that both sides argued over was not the primary obstacle to successful collaboration. The real obstacle was how the goal was articulated— how he goal was argued. The president argued for his goal with promotional tactics— predicting bountiful profits from the graphics lab. However, the production group opposed that goal, arguing that it was not "realistic" to expect that the company could implement such a system in 1984. Bill recognized that this was a clash of differing views of reality: "Fine, it's your idea of realism versus mine!" (p. 123)

The outburst by a subject, expressing frustration about he and a co-worker writing

within such different contexts that they seem to be different ideas of realities, is a product of qualitative methods and represents the kind of data that yields thick description. Doheny-Farina was able to use qualitative methods in a workplace study to reveal motivations and account for the contexts in which writing happens with fluidity and objectivity.

Dorothy Winsor (1999) similarly used qualitative methods in a workplace study to reveal a highly contextualized account of how writing happens among engineers. In her longitudinal study of engineers she initially uncovered a firm belief among writers in the practice of writing as an inscribed version of reality, but through observation learned that the engineers were making complex rhetorical moves with their writing. Engineers asserted their status by adhering to specialized and recognized genres such as reports that argued for design changes even after the stage of projects had been closed. Winsor found that this was a genre-driven response to an expectation within the workplace culture. By following workplace expectations for the genre, writers were making statements about their understanding of workplace culture and the genres it supports.

Several past workplace studies have fixed upon genre as a useful unit of inquiry. Smart (1993) looked at how practices in a bank shaped genres, developing a 4-point theory of genre formation. Cross (1993) considered how genre affects collaborative processes among writers at an insurance company, concluding that while genre dictates much of the writing, social forces play a formative role, as well. Pare and Smart (1994) and Pare (2002) studied social workers in Quebec, Canada and how genre-driven forms limited their power, especially surrounding the act of recording. Perhaps most relevant to

our work in the AO CMS is Spinuzzi's (2003) account of workers in the Iowa Department of Transportation and their use of multiple, often improvised and unofficial genres, to get their work done. By focusing on genre, Spinuzzi was able to get a clear view of how changes in genre use affected other areas of the work environment.

As a group, these workplace studies demonstrate the efficacy of qualitative methods for yielding thick descriptions, answering broad questions and accounting for social forces in the writing environment. It's also worth noting that many of them focus on genre as the unit of analysis. They each arrive at their conclusions through the development of a methodology unique to their contextual situations. Rickly (2007) points out the need to fashion our studies for particular rhetorical purposes and in response to instances, especially considering the highly contextualized environments in which we observe writing happening. In the case of the AO writers and the CMS we built for them, though, I wanted to look at a level of environmental influence and of work across a distributed, interdependent network that seemed to go beyond simple context or situatedness. For this I turned to a theoretical framework heavily informed by activity theory and the notion of genre ecologies.

The Situatedness of Writing

A lot has been written about the situatedness of writing and the role context plays. Into the 1980s technical writing research continued to focus on textual perspectives rather than social ones (Cross, 1993). That changed with the publication of Odell and Goswami's *Writing in Nonacademic Settings*, in which Faigley (1985) urged researchers to augment the textual perspective with a social one. He called for a social perspective

that views texts as "links in communicative chains, with their meaning emerging from their relationships to previous texts and the present context," and for researchers to "consider such issues as social roles, group purposes, communal organization, ideology, and, finally, theories of culture," (pp. 235-236).

Context has also been a concern for the field of design. Suchman (1987) argues for a mode of research that takes into account the shared situations of modern work life, observing that, "insofar as actions are always situated in particular social and physical circumstances, the situation is crucial to action's interpretation" (p. 178). Sullivan and Porter (1997) draw heavily on Suchman's work to make their argument about the kairotic nature of electronic writing. They further argue that studying electronic writing systems "requires a particular and pragmatic sensitivity to the particulars of the writing context- for example, to the particular kairos of the writing system, including the types of writers ad audiences involved, the forms of technology being used, and the types of heuristic methods being applied to the study" (p. 9). Dourish (2004) traces considerations of context in technology design to two origins.

> On the one hand, it is a technical notion, one that offers system developers new ways to conceptualise human action and the relationship between that action and computational systems to support it. On the other hand, it is also a notion drawn from social science, drawing analytic attention to certain aspects of social settings. (p. 20)

Even when designers are responsive to the affect of context on technical utility, they may "fail to address the sociological critique," and subsequently have difficulty designing truly useful technologies. Dourish goes on to discuss "embodied interaction" in response to his need for an ethnomethodological method that treats context and activity as mutually constitutive (p. 28).

For many studies, focusing on context has been adequate, but in response to the challenges Dourish notes, I wish to tightly focus on how the environment outside the interface affects actions at the interface. When contextualizing actions, there is a tendency to privilege the communicative event. Even if we've begun to acknowledge the force of environmental "noise" in the Shannon-Weaver model, the point of inquiry remains the communicative event. Tools for taking into account the mutually constitutive relationship between context and activity are needed.

Activity Theory

The first tool I use to help me consider the networked and contextualized meanings of workplace writing is activity theory. My methods are heavily informed by Spinuzzi (2003) and his work with law enforcement and planning offices. Drawing upon the work of theorists Vygotsky and Leontev, Spinuzzi developed a method of tracing genres across organizations. Focusing on the genre as the unit of inquiry, he divides workers' interactions with those genres into three levels of scope involving activities, actions, and operations. Spinuzzi demonstrates that breakdowns often occur concurrently across each of these three levels of scope. He describes the environment in which writing happens as a "genre ecology" that is "interconnected and dynamic sets of genres that

jointly mediate activities" and uses a genre map, in which the mutually constitutive and mediatory nature of genres is illustrated, as one method of data analysis (p. 63).

Activity theory has allowed other researchers to develop similarly broad ideas about the interconnectedness of modern writing systems. Engestrom (2000) connects the post-industrial economy to the increasing utility of activity theory-driven research, writing that "we are witnessing rapid and powerful waves of emergence and adoption of such concepts as 'learning organization', 'knowledge management" and 'social capital'...they draw on psychological notions of mental processes, yet they take institutions and communities rather than individuals as their units of analysis" (p. 960). One result of this outlook is that actions are no longer confined to the user-interface-technology spectrum, and instead all actions have potential profound effect on the rest of the system. "How can one make sense of these actions in terms of their impact on the participants and their developmental potential?" Engestrom asks, before arguing, "the first step is to uncover the anatomy of these actions as successive, momentary instantiations of a wider and more stable system of collective activity" (p. 961). This sense of writing systems as interconnected social constructs challenges the descriptive limitations of the word "network," Engestrom says, suggesting the "knotwork" as a more descriptive solution.

> The notion of knot refers to rapidly pulsating, distributed and partially improvised orchestration of collaborative performance between otherwise loosely connected actors and activity systems. A movement of tying, untying and retying together

> seemingly separate treads of activity characterizes knotworking. The tying and dissolution of a knot of collaborative work is not reducible to any specific individual or fixed organizational entity as the centre of control. The centre does not hold. The locus of initiative changes from moment to moment within a knotworking sequence. Thus, knotworking cannot be adequately analyzed from the point of view of an assumed centre of coordination and control, or as an additive sum of the separate perspectives of individuals or institutions contributing to it. The unstable knot itself needs to be made the focus of analysis. (p. 972)

In order to share the focus of analysis between the knot and the genres that comprise it, I sought previous work that would allow me retain the genre as the unit of analysis while also recognizing the interconnection between genres, especially in the highly contextualized and fluid environment of the post-industrial workplace. To do this, I turned to the metaphor of genre systems as ecologies.

Genre Ecology

Spinuzzi's genre tracing method and notion of genre ecologies presents a useful lens through which to spot these "unstable knots" Engestrom says should be the focus of analysis. Honkaranta (2003) similarly notes that genre-driven studies are adept at revealing information about practices without placing them in continued opposition to technologies. In attempting to reveal the underpinnings of the AO writing system by training our attention on the genre as a unit of inquiry, Activity theory leads us naturally

to a broader understand of writing system, one that Engestrom calls a knot, but which Nardi and O'Day (2000) liken to an ecology.

In drawing a parallel between biological and information ecologies Nardi and O'Day focus on the diversity and symbiosis inherent in both. They say that, "Information ecologies are composed of people, practices, values and technologies" and "share much with biological ecologies: diversity, locality, system wide interrelationships, keystone species, and coevolution" (p. 211). They identify as the primary difference the fact that in the case of information ecologies, "we no longer have the luxury of slowly, organically evolving our practices to catch up with radically changing technologies" (p. 210). Instead, we must critically evaluate our needs and make deliberate decisions about our activities to maximize the sustainability of our systems.

I would like to deepen the ecology metaphor Nardi and O'Day offer, hopefully with the result of further illustrating the need for more knowledge about our writing systems and the roles technology plays in them. I suggest that the need to actively maintain our ecologies is not unique to the information variant, and that changes surrounding industrialization have affected both. The widespread effects of the industrial economy on our biological ecology have resulted in large scale efforts to apply, as Nardi and O'Day write, "human values to the development of practices and technologies" (p. 211). Recycling programs, local food efforts, carbon emission reduction programs, and stiffened environmental protection regulations all serve as example. Going further, recent work in the biological science has focused on the "ecosystem services" provided by natural landscapes, such as the value of honey bees for pollinating agricultural crops.

Habitat restoration studies tackle not only limiting future damage, but reversing earlier mistakes. All of these activities were introduced and then executed by actors interested in applying human values to their interaction with the industrial economy. Today, we see the post-industrial economy, with its emphases on knowledge work, distributed work and CM, pushing us to take anticipatory responsibility for the changes we introduce to our information ecologies. The lessons we learned when our biological ecology faced an industrial economy, and the actions we now know came too late, serve as dire warning of the need to develop tools for navigating the waters at the confluence of our information ecologies and the post-industrial economy.

Another result of the industrial age was present concern surrounding non-native species introduction. As goods were shipped around the world, organisms such as insects and fish were also transported, often in cargo dunnage or ballast water tanks. These species, which were kept in check in their areas of origination by biological means, sometimes found themselves in new lands without predators or other biological checks. The result can be an ecological imbalance, with non-native species thriving at the expense of valued native organisms. The threat these non-native species pose to local ecosystems is analogous to the effects which altering a writing system may have on the writers in that system. When we introduce technologies to writing system, we inevitably change that system. One common change is the creation of new genres.

If we consider Nardi's and O'Day's likening of biological and information ecologies, we can also consider introduced genres as non-native species. These are points at which changes in the system may be most likely to occur. This is where breakdowns

may happen, where common activities may be thwarted. Writers are likely to innovate new genres in response to problems in these spots, and to make changes in the system that keep introduced genres in check, protect existing ones, and uphold the values around which the writing system was developed. Nardi and O'Day offer information ecologies as a call to think closely about how we implement technologies. By folding this metaphor into the workplace study and activity theory addressed earlier, though, we can develop a keen eye for focusing on precisely how a writing system reacts to change. Our earlier theories enabled us to ask, "how does writing happen in this system?" An ecological metaphor drives us to question, "what effects does CMS introduction have on the system?" Both questions are vital for informing the future design on CMSs that successfully facilitate writing work in the post industrial economy.

Data Collection and Handling

The theoretical framework outlined above allows me to look at both the situated actions of writing with technology and the cultural factors affecting that writing. The CMS was opened up to the writers with limited functionality in the fall of 2008. At that time, I began formulating a strategy for data collection, planning to increase my presence in the workplace as the writers began working with the CMS. At this point, the CMS remained on the WIDE developmental server, and did not include a web publishing function. Writers could use the system to create content that would later be published to the web, and so much of the work writers did in this time period involved migrating content from the old Web site to the CMS in anticipation of future web publishing functionality.

Data Collection

In developing my data collection method, I consulted prior work on ethnographic studies and qualitative research. Several scholars have pointed out the appropriateness of qualitative studies to reveal contextually relevant data. Cross (1994) identified the utility of ethnographic research for gathering the kind of data that leads to thick description and knowledge based on experience rather than propositional language. He also identifies four extreme views ethnographic researchers should avoid: researcher-centered, research-community centered, subjects-centered, and data-centered. A good ethnographic study will balance these four views.

Sullivan and Spilka (1992) wrote that qualitative research is particularly adept at interpreting or exploring a situation. Much of their article is devoted to a discussion of rigor in qualitative writing studies, and they argue that successful research asks "how and why" questions and is based on a solid theoretical foundation. Sullivan and Spilka offer as an example of a commendable study one completed by Susan Klienman (1993). In an 18-month study of document review in a governmental accounting office, Kleinman used a number of data collection methods including interviews, meetings, and communication logs.

Creswell's (1994) methods recognize four main types of qualitative data collection: observations, interviews, documents, and audiovisual materials (pp. 186-187). This study used the first three types, and also followed several of the procedures Creswell offers to intensify rigor of qualitative studies: triangulating data types, member-checking to determine accuracy, using thick description to convey findings, spending prolonged

time in the field, and using peer debriefing to enhance the accuracy of the account (pp. 196-197).

My primary data collection method was field notes. My field notes included those notes I took while observing writers in their writing environments and the notes I took during meetings between the development team and client. I met with each writer individually approximately three times throughout the study. Prior to these sessions, I asked the writer to have some typical tasks ready to complete. As they performed this work, I observed their actions, taking notes. I paid close attention to both the activities they engaged in and the operations they performed at the interface level. I employed a variant of a talk-aloud protocol, and myself rarely spoke until the writer had completed their work. After the observation, I shared with the writer some of my observations, asking them to clarify any points that remained unclear or that they believed I had misjudged.

While spending time in the office I also collected samples of writing that I saw playing a role in online work but which were not visible on the CMS. These materials included notes, annotated printouts, and self-produced help documents. I also saw email being used to facilitate CMS writing and made note of the role this tool played in certain activities. Finally, I asked each writer several times during each observation session to take a screen capture, which I retained. These sometimes illustrated design flaws or system bugs and sometimes focused on practice-oriented scenes like their tendency to keep multiple windows open at once, with several programs mediating their work with others.

I developed these data collection methods through careful consultation with prior literature on ethnographic and qualitative study. In the end, three data collection methods played the greatest role in this study.

1. Field notes (from observations, interviews, and meetings)
2. Collected secondary documents (notes, guides, email)
3. Screen Captures

Data Analysis

The dangers of a narrow focus at the analysis stage have been addressed, and in many cases triangulation has been an acceptable answer (Creswell, 1994; De Pew, 2007; Spilka, 1990; Sullivan & Spilka, 1992). My analytical approach involved triangulating the patterns I saw in my field notes with writers' responses to those patterns as well as the physical evidence left by writing from inside and outside of the system. In this way, I endeavored to create thick descriptions of how the CMS assisted writers in performing their work and ensure that I was not letting isolated incidents or mistaken observations on my part effect changes in the design of the CMS.

Qualitative research involves finding patterns, which I did in the data analysis, using a number of different techniques. The first was genre mapping, which allowed for a close look at the connection between actors and the introduced genres and helped identify the introduced genres around which I planned to focus my inquiry. As I worked with writers, I made note of where breakdowns occurred in their work. I later traced these breakdowns across the activity, action, and operation levels of scope in an effort to gain a wider view of how writers reacted to changes. I created workflows, following the steps

writers took to complete a task, noting any breakdowns or new genres that appeared, and compared these workflows to the previously-completed genre tracing. Comparing the workflows with the genre tracings I performed following observations was one useful method of data triangulation, as it revealed that seemingly banal breakdowns in operation sometimes had roots in higher activity-level disco-ordinations. Finally, I combed my data sources for patterns and then developed narratives of typical activities in the office. The result is what I believe to be a representative account of the complex and mutually constitutive writing system, and the changes it underwent in response to introduction of the CMS.

In the next section, I will detail several of these narratives in order to illustrate how writers used the CMS and illustrate the points at which the CMS sometime eased and at others introduced tension in the writing practices of the AO.

WRITING PRACTICES AFTER CMS INTRODUCTION

In the previous section I outlined an activity theory-driven method for examining writing practices. The method focuses on the genre as the unit of analysis. In this section, I put these methods into practice, drawing upon the data I collected through AO observations and interviews to create workflows and writer profiles that demonstrate the effects of the CMS on the AO writing systems. I will first describe the introduction of the CMS and the format of the observation and interview sessions. Then I look closely at four example writing tasks, focusing on the genres involved in the tasks and the roles of writer and CMS. At points, moments of tension that warrant further discussion occur. These points of tension will be revisited in the subsequent "How the CMS Challenged the System" section.

The AO writers were first offered a working version of the CMS in November 2008. This was a limited-function beta version of the CMS that remained on the development team's server. The AO writers could create new documents, add them to the repository, identify documents with meta data, request and perform reviews, and other actions. At this point, the CMS did not yet have a Web site maintenance function. Content could be created, but could not yet be published to the web. As the AO writers worked to populate the CMS repository with content, the development team created the Web site maintenance functions. By February 2009 the fully functioning CMS was made available to the AO.

Between November 2008 and March 2009 the development team met with the AO writers as a group once and held an additional meeting with one coordinating writer. In

addition, I observed four AO writers over multiple sessions in their regular workspaces. I observed each working on tasks within the CMS and then spent approximately 20 minutes discussing their impressions of the CMS and the work they completed. I asked them to save screenshots at relevant moments in their work, such as when an error happened or when they used multiple texts to accomplish goals. During the observation periods I attempted to refrain from offering assistance, instead prompting writers to work through problems. Often, we returned to discuss those incidents following the observation, either to verify my observation notes or to identify potential problems with the CMS or help documentation.

Following the interviews I created workflows from the activities I observed. In the workflows I identified the genres used and traced their use across the three levels of scope Spinuzzi (2003) discusses. According to Spinuzzi, work in a writing system happens at the activity, action, and operation levels. Tracing the use of genres across these three levels of scope can yield a broader view of how writing happens.

In performing this analysis I found that the CMS was achieving many of the goals we identified for it. The CMS was streamlining several processes, such as the saving and sharing of documents. This activity had earlier been performed using an ad hoc file naming convention and a system of word processor documents attached to emails and saved to shared storage devices. The CMS eased this process by managing the workflow from originating author to reviewer and tying reviews, revisions, and original drafts together under one document name. Writers appeared to be comfortable with the CMS interface and the actions the CMS prompted them to take mirrored writers' intended

actions.

I did identify some problems with the writers' use of the CMS, though. In the following pages I will offer four examples of the problems I identified and the work from which they emerged. The first was an incompatibility between how writers collaborated and the limited functionality of the review function we had built into the CMS. The second spoke to the value placed on technological skill within the AO group. And finally, one writer demonstrated over two consecutive observation sessions several problems centered on the process of adding meta data to documents in the CMS, an action with which the AO writers were unfamiliar and ill-equipped to complete.

Example 1: Beth[3] Responds to Reviewers

When first given access to the CMS, much of the work the writers did with the CMS involved migrating content from the old Web site. Content was copied from existing HTML pages and pasted into the new CMS documents. In many cases it was decided that documents also needed to be updated, though, and so there were collaborative actions even at this early stage in AO CMS use. Beth created new documents in the CMS and she shared them with both John and Ellen, offering each an opportunity to change the content of the document. Her work was somewhat complicated by the fact that John and Ellen represent different interests in the AO. John cooperates with outside offices on external programs while Ellen coordinates internal programs. John and Ellen both heavily edit documents Beth creates and it is Beth's responsibility to synthesize those edits into the finalized document.

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3 All names have been changed.

We had designed the CMS to mirror existing practices and relationships in the AO, so it was interesting to find that in at least one instance, the streamlining of existing workflow challenged the hierarchy of writers in the system. John and Ellen hold positions roughly equivalent to each other but senior to Beth's position. Beth considers her synthesis of their edited document a perfunctory task for which she assumes little responsibility. When she edits the document to reflect synthesized comments, however, the CMS assigns to her ownership of the changes, changes which she would prefer not own (the implications this situation holds for Beth's work and her use of the CMS will be addressed in the next section).

Workflow. The workflow below details a typical work session for Beth in which she responded to multiple reviews regarding a single document.

1. Beth received two instances of the genre "review" from John and Ellen.
2. Beth received John's review as an MSWord document attached to the genre "email instructions." In the email, he summarized changes he tracked in an MSWord document (genre "review"), and directed Beth to, when his edits conflict with Ellen's, execute Ellen's changes rather than his own.
3. Beth types the changes John directed into the original MSWord document, creating the genre "revised document."
4. Beth must now work with her revised document and John's and Ellen's reviews simultaneously. Because she finds it cumbersome to navigate between more than two different windows on her 13-inch screen, Beth prints out John's review, creating a hybrid of the genres "revised document" and "annotated

printout."

5. Ellen sent her review as an email. It is an MSWord document with changes tracked. Beth refers to the printout from John, and Ellen's review, finding Ellen's changes, checking to see how they mesh with John's and then executing them in the editing pane of the CMS. The result is an updated instance of the revised document.
6. Beth creates the genre "revision note" saying that she has revised the document as directed by John and Ellen.

Beth's work with the CMS is complicated by the fact that the systematized workflow of the CMS affects the appearance of her placement in the office hierarchy. In the past, documents were edited by collaborators, saved, and then shared with all collaborators via email. Changes were attributed to the individual who made them, and Beth simply synthesized the changes after they were shared with the group of collaborators. In the CMS, collaborators respond to her request for review and privately submit changes. Beth effects those changes by editing the document, at which point the CMS publicizes them by stating in the aggregator that Beth has made changes. Within the CMS, all changes become Beth's, even those that she does not agree with, did not make, and does not wish to take responsibility for.

Example 2: April Edits a Document

April's work in the AO contrasts sharply with Beth's because she is responsible for much of the Web work that happens. While the main AO Web site was previously

updated only by Kate, Mary's group maintained a separate Web site at a different location. April's primary duty was to maintain that Web site. One day on which I observed her working she was transferring content from the previous Web site to the CMS, a task Beth, Ryan, and Mary shared as well. Unlike these other workers, though, April is not often involved in the composing process. Instead, she edits content as instructed by Mary. Mary communicates these changes to April by printing out existing Web pages and making annotations on the printouts (Figure 6).

While editing a document is a common practice within the AO, my observation of April suggests that the word "edit" is actually used to convey more than one activity. We had originally identified small changes made to originating authors' documents by other AO writers as editing. For example, one author might write a document and share it with another author, who might change two words, correct a spelling, and remove a contentious statement before returning the document to the originating author. In response, the CMS was designed to support the practice of executing small changes in a document. In the case of April, though, we find those changes being delegated by a superior, an activity that requires the use of an innovated genre (the annotated printout).

Workflow. April typically makes changes to web-specific content as directed by Mary through additional genres available outside the CMS. While her work is called "editing," it differs from the editing work done by her coworkers both in action and the tools used to complete task.

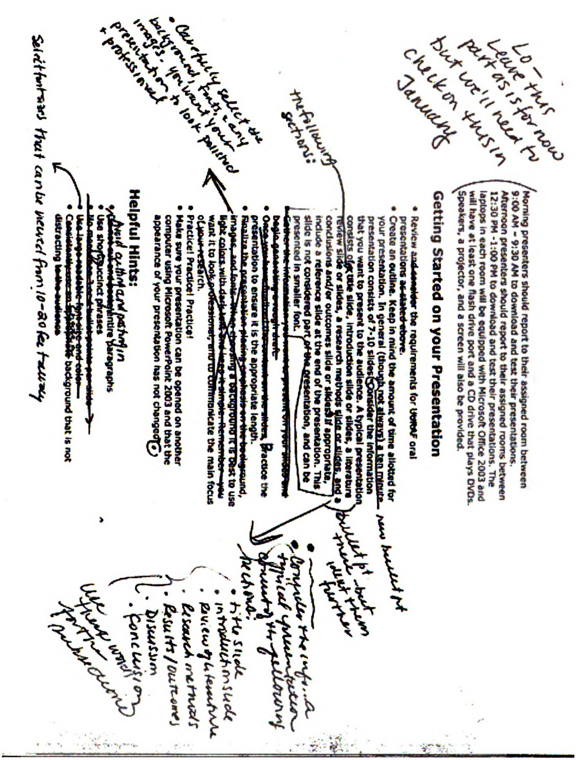

Figure 6. (Employee's notation/work.) When directing employees in editing action to take on web content, Mary printed the web page and annotated the print-out.

1. April is duplicating content from the previous Web site onto the CMS using the genre "editing pane," an interface introduced as part of the CMS.
2. She refers to the genre "annotated printout," provided by Mary, to execute edits to the document that Mary has previously identified. The annotated printout does not direct action, that role is played by the genre "verbal instructions," that Mary gave to April along with the annotated printout.
3. April executes the changes Mary directed, creating the genre "revised document."
4. April is prompted by the CMS to apply meta data to the revised document by using another CMS interface genre, the genre "meta data pane."
5. The concept of meta data is new to April. She refers to directions from Mary, conveyed through the genre "email instructions," on what meta data to apply to the document.

April performs a very different kind of work in the AO. While Ryan collaborates with Mary on writing, making suggestions, and researching background information, April follows Mary's instructions, completing vitally important technical tasks. Beth faces the similar problem of being asked to execute changes directed by others, but she is also required to negotiate complicated office political issues, synthesize recorded opinions and creating new content. This differs greatly from the more perfunctory role I witnessed April playing. What makes this difference notable is that April is the most highly skilled person in the AO in terms of web authoring software and practice, a skill-set that drives most of the work she performs in the AO.

Example 3: Ryan Reviews a Document

The first time I observed Ryan work with the system he responded to a request from Mary that he review a document. This was Ryan's first experience with the system. Reviewing documents is a regular piece of the AO office writing practice. Before documents may be published, they must be approved by an administrator. We built the review function to facilitate this process of reviewing and approving a finished document. It allows writers to request a review by another writer, at which point the reviewer has access to view the document, even if it has not yet been made public. The reviewer may not change the document, but rather is given the opportunity to write a short response paragraph.

We had designed the CMS to support a review function that would be used to approve documents for publication. In practice, writers were using the review function in this manner, but I also found writers using the review function in a second practice that resulted in some frustration for them. In the AO culture to "review" a document does not mean to write a response as to its quality and efficacy, but rather means to actively collaborate on a document, annotating and making changes to the draft document. We had labeled the task "review" as in "review and approve," a perfunctory task that might require only a short separate notation about why the document was approved or disapproved for publishing.

Workflow. The incompatibility of these two interpretations, and their seat in the cultural norms of the AO office, becomes clear in the following workflow.

1. Ryan has received the genre "request for review" from Mary. He reads the request

and identifies that Mary wishes for him to share his overall thoughts on an MSWord document she has uploaded to the system.

2. Within the invitation is a link to download the MSWord document. Ryan clicks the link and the genre "draft document" opens automatically. Ryan reads the draft document, making marginal annotations with the MSWord commenting feature.
3. Ryan saves the genre "revised document" on his local storage device after adding his initials to the end of the file name.
4. Ryan switches from MSWord to the CMS, which prompts him to compose a paragraph-long comment on the draft document. He switches back to MSWord, copies the text of the comments he made in the original document, returns to the CMS, and pastes them into the review window there, creating the genre "review."
5. Ryan is prompted to create the genre "review note." He identifies that these are his comments on a document Mary created and requested he review.
6. Upon submitting the review Ryan comments aloud that he will likely verify verbally Mary's receipt of the review.

This workflow, while representative of the genres Ryan employed and actions he took in completing a review, does not reveal why he made the choices he did. In particular, comments Ryan made at the fourth step of this workflow revealed a breakdown in his ability to work. After saving the revised document on his local storage device, Ryan scrutinized the CMS interface. He was looking for the CMS to mirror the common practice of attaching a document to an email. Upon realizing that the CMS does

not support the use of revised MSWord documents as a response to a request for review, he said aloud, "So, there's no way at this level of review to attach it and send it back."

Ryan immediately developed a work-a-round, which was to copy his review comments into the review window. This worked well for Ryan. Because his review consisted of brief marginal comments and no actual changes to the text of the document, the review pane was an adequate device for delivering his review. Other writers, however, review very differently from Ryan, making extensive comments and adding or deleting large chunks of text. While the workflow I observed Ryan using hinted at the disagreement in the AO sense of review as collaborative event and the development team's sense of review as consideration of approval, Ryan's actions were, at least in this example, more in keeping with the development team interpretation.

Example 4: Ryan Composes a Document

Early in our work with the AO we found that none of the writers were experienced with applying meta data to documents. Even tagging images, a common action in Web 2.0 applications, was unfamiliar to them. We also knew that they relied heavily on browsing for files on shared drives and to attaching documents to emails. Given the unfamiliarity with tagging and their experience with hierarchical folder-based systems for organizing documents, we anticipated that adopting useful methods for adding meta data to documents might be a challenge. This was a concern because the open repository structure of the CMS meant information not descriptively tagged would be difficult to retrieve later. In my earliest observations I witnessed a lack of understanding of meta data and a non-descriptive system for tagging documents.

The second time I observed Ryan working on the CMS system was in March 2009, when he was transferring information from the previous Web site into the new CMS repository. Ryan was copying text from existing Web pages and pasting the content into the CMS composing pane. He was being careful to erase hidden style information that may have carried over from the older site, such as layout tables or images, as he had found these sometimes had a negative effect on text display in the composing pane. Most interestingly, though, I saw Ryan referring heavily to a copy of the planned Web site hierarchy. He had made several notes on the printout and explained to me that they indicated information he had yet to update, or information he had skipped because issues beyond his technical expertise, such as embedded flash content, complicated its transfer (Figure 7). He was also using the printout to add unique and specific tags to each piece of content he added.

Workflow. My observation of Ryan in March presented a more streamlined workflow, one that worked around certain aspects of the CMS while showing a newfound and unanticipated utility for meta data.

1. Ryan confers with the genre "Annotated Printout" to determine what content needs to be duplicated in the CMS.
2. He locates the content on the existing Web site, copies it, and pastes it into the composing pane in the CMS to create the genre "New Document."
3. Ryan removes any images or imported style information from the text in the "New Document."
4. Ryan confers with the genre "Annotated Printout" and works within the genre

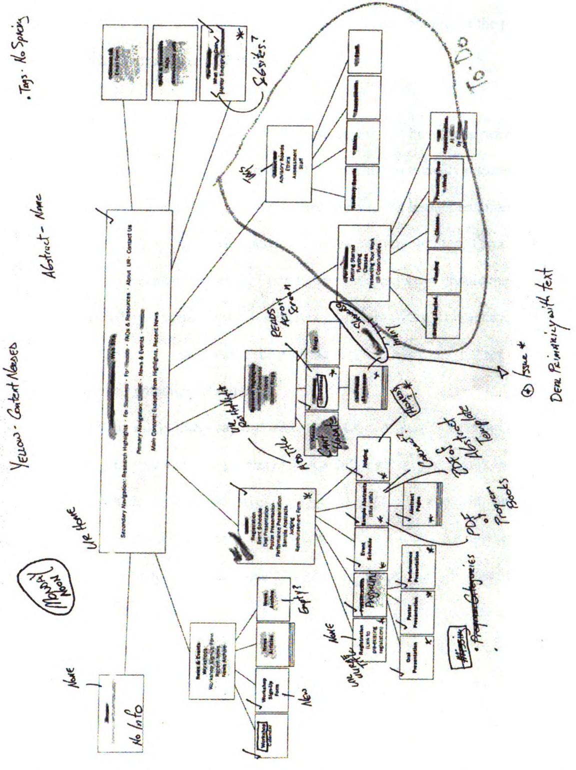

Figure 7. (Employee’s notation/work.) Ryan's annotated map of the website hierarchy.

"Meta Data Pane" to assign tags to the new document that reflect the planned hierarchical structure of the Web site.

We had originally thought descriptive meta data would be a useful way for AO writers to situate their documents within the CMS, making them easily retrievable and accessible for reuse. In sessions spent with writers early in the implementation of the CMS, meta data was haphazard when recorded and more often omitted. Three months following the implementation, though, I saw Ryan employing a systematic method of tagging developed by leaders in the AO who recognized its utility. This accepted system described the document's place within the planned Web site hierarchy, not the nature of its contents or their potential for reuse.

While Ryan might likely say that his contributions to the AO have not changed much over the past six months, my observations of his work suggest otherwise. He continues to work closely and exclusively with Mary, communicating with her through hand-written, oral, and digital means. His primary work with the CMS continues to surround replicating content from the old Web site on the new one. The manner in which Ryan interacts with the CMS has changed, though. When copying and pasting material, he is careful to "clean up" the text to ensure invisible formatting codes do not alter presentation. He accepted the act of adding meta data to documents as a necessary part of the composition process, and follows closely the system Mary has laid out for him to do so.

In this section, I described the process I took for analyzing data collected in the

AO office over several months. I traced the tools writers were using across three levels of scope, gaining a view of how activities and actions interacted to shape the way writers used the CMS. A natural result of this technique was to create workflows that followed writers through their uses of various genres in completing their work tasks. This method allowed me a view of writers that did not focus on their ability to complete tasks so much as their ability to see tasks through to completion. Rather than testing the software, the writers were using it, and their struggles represented the natural messiness of how writing work gets done.

By focusing on genres as the unit of analysis I was able to derive sample workflows representative of typical activities in the AO. In the next section I will look more closely at these workflows, recalling the activity theory-driven theoretical framework invoked in the "Methodology" section to consider how CM affected this established writing system.

HOW THE CMS CHALLENGED THE SYSTEM

To create the workflows described in the previous section, I interviewed and observed writers in the AO across 13 months of their work. The first several months spent with the AO writers informed the development of the CMS, which was implemented in November 2008. Following the implementation, I continued to observe them writing, both with and without the CMS. My analysis of the data collected yielded writer workflows and profiles, and the patterns I found in them reinforced the suspicion that, despite the research team's intention to develop a CMS that closely mirrored existing writing practices, introducing the CMS had caused moments of tension in the work I observed. Sometimes this tension could be attributed to interface design or software functionality. In the previous section, I touched upon some of these moments of tension. In this section I illustrate the challenge the CMS presented to the workplace culture.

Dourish (2004) argues that in writing systems, activity and context are mutually constituted. He calls this phenomenon "embodied interaction" and says, "the essential feature of embodied interaction is the idea...of allowing users to negotiate and evolve systems of practice and meaning in the course of their interaction with information systems," (p. 28). We wanted to gain that kind of insight into the workings of the CMS the writers. Looking through the writer profiles and workflows our observation and analysis yielded, we began to see patterns and points of both similarity and divergence between the writing in the AO before and after the introduction of the CMS.

What Remained the Same

A number of aspects of writing in the AO appeared to remain unchanged by the

introduction of the CMS. Most notable is the role collaboration continued to play among the AO writers. None of the tasks writers told us about in the preliminary research stage indicated writing was sometimes a solo endeavor. After introducing the CMS, writing continued to require collaboration between multiple authors. Beth serves as an example of highly collaborative work, as she must synthesize editorial comments from multiple editors into a single revised document. Even the most direct flow of work to publication requires at least two authors, one to originate and one to approve.

Another characteristic we continued to observe among the writers both before and after the introduction of the CMS was the use of multiple technologies to share and revise documents through the writing process. Slattery (2007) also noted this practice in his study of technical writers, attributing it to the way knowledge work gets done in distributed work environments. In the previous system Linda coordinated seminar descriptions through a complex workflow involving nine steps, four people in three buildings, and at least four software tools. Additionally, this workflow involved three documents and 8 separate transfers of those documents among writers. These transfers were sometimes made as email attachments between offices and via a shared storage device within the AO. The CMS was designed to streamline this process to involve five steps, two documents, and facilitate document transfer and coordination of revisions. However, writers tend to use the CMS as an additional technology within the existing workflow. They continue to share documents widely, to use the CMS in addition to rather than instead of shared drives and email attachments, and to voluntarily introduce new genres, such as annotated print-outs, to facilitate their work surrounding the CMS.

With the CMS implemented, writing destined for the web continues to be thought of separately from other print or inter-office works. Previously, technological limitations on how things were published to the web inscribed a binomial conception of the relationship between web and print writing. The different software and technical skills necessary to publish to the web made web writing a unique endeavor. The CMS, however, makes it as easy to publish online as to print out, and reflects the workflows that lead to publication in both digital and print media. Prior to the implementation of the Web site management functions of the CMS, one writer told me, "I might use it more when I can actually put things on the web." In fact, use of the CMS increased substantially once the web management function was implemented, and again when the AO decided to make an update to the site's visual design.

What Changed

While some aspects of the AO writing system persisted through the introduction of the CMS, others changed. One of the most drastic changes was barely visible: the systematization of the workflow. What once were deliberate moves writers had to make in order to move documents through the workflow became automated progressions. For instance, in the previous system, when Mary composed a document destined for the web, after composing she would recall the ad hoc process by which drafts are vetted in the office, selecting an appropriate reviewer and taking the necessary steps to move the document forward. With the CMS, this previously ad hoc process is formalized, and rather than recalling the particulars of the process, Mary is prompted by the CMS to select a colleague to review and that colleague is informed of the existence of a new task

to be completed.

When, in the example above, Mary created a document using the previous system, she would not only need to remember the ad hoc process, but she would have to coordinate the sharing and storage of multiple versions of documents among colleagues. Between the events of composing and publishing to the web she would collaborate with at least two colleagues, involve three software tools and ultimately create at least three versions of the document, all stored on multiple and diverse devices within and without the AO office. With the CMS, that complicated workflow was greatly simplified, and could be completed entirely within the CMS. Further, documents and all of their versions are stored in one location and tied together within the database, making previous versions retrievable and most recently approved versions the default view. The AO's previous methods saw file versions stored on shared drives and local computers with file names like "professionalseminar08_draft" and "professionalseminar08_ellenrev1." These document versions might reside with different names in multiple locations, and outside of the email documents to which they were originally attached were not tied to the process-driven messages that contextualize their use. Systematizing file naming conventions has been used previously to streamline these activities (Bernhardt, 2007). Similarly, the introduction of the CMS drew a thread across all versions of a document and the review requests and notes that lead to their final published versions.

Another change was the shifting of job duties. In the previous system Kate served as the primary handler of information destined for the web. She proofread documents, posted them to the Web site, and updated them when edits were necessary. In our early

research we identified this point in the AO system as a bottleneck. The CMS, and especially its Web site manager function, eliminates this bottleneck, allowing anyone with appropriate administrative approval to update or edit pages on the Web site. This marks a large change in Kate's workload, as she no longer shoulders responsibility for maintaining the content of the Web site. It also reduced the impediment for others to make changes by offering a more immediate result following a personal action. It is our hope that, with the ability to make changes to the Web site quickly and easily, the AO will see an increase in new and current content on the Web site.

The CMS also introduced to the AO several new genres, chief among them the editing pane, review note, and meta data pane. The editing pane, with its similarity to other common composition interfaces, settled into the AO workflow without great challenge. But as the AO writers used the CMS, they developed practices surrounding other genres, some planned and others innovated. For instance, the review note genre was implemented to mirror the textual content in the emails to which AO writers had previously attached edited MSWord Documents, but Ryan uses the review note to record his completion of the reviewing task, entering text such as "Ryan made changes to this document." The fact that writers developed innovative uses for these genres is not surprising; previous work suggests such innovations are inevitable in complex writing environments (Engestrom 2004; Nardi & O'Day, 1999). But it is useful to note these departures from our intended uses for the CMS, especially in the cases of the annotated printout and the meta data pane. The uses to which writers put these genres mark even greater changes in how the CMS caused their conception of writing and its inherently

social nature happens.

The Annotated Printout

In our earlier research, AO writers indicated that while most writing happened in word processing software, handwritten notes and printouts of digitally composed texts were also sometimes used. Given this information, it was not surprising to see the AO writers using handwritten notes in conjunction with their work with the CMS. I observed Ryan conferring with a printout of instructions for successfully copying texts from web pages and pasting that text into the CMS composing pane. I also saw Beth printing out documents when her work required her to view three documents simultaneously, a practice made difficult by the small size of her monitor.

With the introduction of the CMS though, writers innovated a new genre to mediate their previously tactile practices with the new digital environment. I have here labeled this genre the annotated printout. To illustrate the nature and import of the annotated printout, I turn to Ryan and his use of the planned Web site architecture diagram for tagging documents. The architecture diagram, like a map or schematic, is both conceptual and spatial. It represents not only a Web site, but a way of conceiving the Web site, and of conceptualizing how items will be situated in relation to one another. In order to create the Web site according to the architecture diagram, Ryan printed out the diagram and then systematically attended to each item on it, letting the planned architecture affect what order he worked in, and what types of work he did. As he finished tasks, he crossed items off the diagram. When a page had content he didn't know how to move, such as a flash animation, he made a note on the diagram, using differently

colored pens to represent different actions or situations (blue if he had decided a piece of content might be unnecessary, red if he had been unable to successfully transfer it to the CMS, etc.)

Ryan told me these notations would not be shared with others, but that working with the map and notating his work progress on it directly helped him both keep track of his progress and visualize the completed state of the Web site. In this use, the annotated printout was helping Ryan mediate between a conceptual diagram that doesn't render well on the screen and his work with the CMS.

Annotated printouts also emerged as a way to transfer knowledge between two or more writers. When Mary desired April to make changes to existing web content, she printed out pages and made notations on them by hand. The annotated printout genre was necessary here because she couldn't record the types of character-level edits she wanted within the CMS. Printing out the web pages and annotating by hand allowed a finer level of control than the CMS review note genre afforded, and also a more accurate level of visualization of the content than using track changes in a MSWord document would have. For Mary, the annotated printout was necessary to convey direction to another writer about changes to a digital document.

Meta data

The CMS prompts writers to apply meta data to each document. This includes a title, description and any tags the writers deem appropriate. In each of the observation sessions conducted at this stage of the project, AO writers evidenced a limited understanding of both the value and necessity of applying meta data. Titles for documents

were often vague, reflecting the universality of many documents written for the web, with names like "about" and "home." More often than not writers did not write descriptions for documents. Sometimes descriptions were one word reminders of the media for which the document was intended, such as "Web site." Tags were rarely applied to documents.

The decision not to apply meta data does not appear to be attributable to interface problems, as all writers were witnessed entering data at least once, and then without problems. Rather, the decision seems driven by the AO writers' shared idea of what writing is. They see texts as tied to specific actions, such as a request for review. After the review has been completed, the event of the request has no apparent value, and because the documents will be instantiated in a physical webpage, there is no need to make its revision history or raw text easily available to other users of the CMS. This set of values is reflective of traditional multi-source writing systems that produce printed artifacts, but a lack of meta data does pose problems for a CMS that does not rely on hierarchical metaphors (such as file folders) for document location.

In the months following the observation session in which I witnessed Ryan struggling with meta data, the AO CMS project experienced some large scale changes. By the next time I met with Ryan, the web maintenance function had been introduced, an event that AO writers told me gave more import to the work they did with the CMS. "Before, when we were adding content, we knew that we were just going to be doing it over again once the system was finalized," Mary told me. In this time, the AO writers also contracted with an outside design team to create page designs that would interact cleanly with the CMS back-end. An additional service the outside design team provided

was a proposed mapping of the Web site architecture, a tool the writers used to guide their creation of content and which sparked a change in how the AO writers conceived of and used meta data.

Once she had the architecture map, Mary had questions about how best to arrange title information, and about how to demonstrate the relationships between content pages. For instance, student profiles might have, in the earlier system, been titled "A0 – development programs – seminars – branding." In the earlier observation rounds it would have been titled with one of these hierarchical levels, and possibly tagged with a single other (although tagging was often omitted altogether). The tags likely would not have distinguished it from any other information in the repository (writers at the time were tagging all content with words or phrases such as "Web site" or "programs"). Encouraged by the architecture map to visualize the Web site content as related to a number of different levels of hierarchy, Mary recognized the utility for using tags to associate groups of documents to each other independent of their relationship to any other set of documents. For instance, a student spotlight might be tagged with that word, plus the name of the student, and undergraduate research, and could be located within any of those groups depending on the writers needs.

I witnessed Ryan following this systematized tagging method when I observed him in Spring 2009. Following written directions from Mary and referring often to the Web site hierarchy map provided by the outside design team, he gave documents as many tags as the map suggested might be useful.

We had originally thought descriptive meta data would be a useful way for AO

writers to situate their documents within the CMS, making them easily retrievable and accessible for reuse. In our vision, writers would compose documents, then write versatile descriptions before anticipating opportunities for reuse and tagging the documents to make them available to future reusers. In essence, we envisioned an organic system of relationships between documents, tended by the AO writers. After early observations, we were concerned tagging might not take hold, but within a few months writers had systematized a method of tagging. It was not, however, a method aimed at the kind of system we had envisioned.

In fact, the tagging system the AO writers adopted reified, rather than subverting, the established hierarchical arrangement of documents. Faced with the question of how to reflect hierarchical file browsing in a folder-less Web site, they adopted tags to situate documents within the planned Web site hierarchy. Each document was tagged with each level in which it nested, and was tagged with no other additional descriptive information. This was not an ad hoc system, but one that was devised by Mary through conversations with the development team, and communicated to other AO writers both orally and in writing.

Tensions Between CMS and Workplace Culture

Originally unsure of how to use the meta data genre in the CMS, the AO writers quickly identified a utility and developed and documented an official practice for the use of meta data across the organization. Their early struggles with meta data speak to more than a technical unfamiliarity, though. Our activity theory-driven methodology suggests

that the meta data interface posed some severe challenge to the shared experiences and assumptions AO writers held about writing. Here, I will discuss how the meta data issue revealed cultural challenges faced by AO writers, and introduce two other instances which our genre tracing and mapping revealed points of cultural tension spurred by the introduction of the CMS.

We witnessed, over several months, AO writers move from avoiding the meta data pane altogether to following an official published protocol for adding meta data to documents. In fact, Mary, who in November 2008 told me "I don't really see a use for meta data," in March 2009 drafted and distributed the official protocol for tagging documents. When the CMS was initially introduced none of the writers were familiar with the concept of tagging. One drew a connection between tagging and the labels her email client allowed her to attach to messages, but no one anticipated how meta data could or would be used within the new CMS. This speaks to a shared concept within the CMS of writing as the process of composing text. The introduction of meta data to the AO system required writers to add to each of their workflows a moment in which they write about their writing, an entirely unfamiliar action for the AO writers.

The use the writers eventually adopted for meta data, that of mapping hierarchical relationships between documents, was not the one we had envisioned. Its adoption, however, did not require a shift in workplace culture, in the concept writers had of what writing is, because organizing by hierarchy was a previously established practice. Writing systems are ecological in nature and the writers eventually found a use for the meta data function that fit comfortably within their existing workplace culture.

Another example of the challenge the CMS placed on the existing AO workplace culture is its suggestion of the appropriateness of document sharing. Early in the project we had conceived a single-sourcing tool. In the development stages these features were eliminated, but we continued to stress the opportunities a CMS offered for making information available to other writers and reusing text between projects. These discussions, however, again challenged the idea among AO writers that authorship is closely tied to origin.

The field of rhetoric has long been marked by diverse ideas about the nature of authorship, and recent work has focused on the notion of authors as "reusers" and "remixers" of existing material. Within the AO, however, questions of authorship are rarely gray. Despite the heavy collaborative editing and revision that characterizes writing in the AO Office, authorship is always attributed to the writer who composed the original draft. Similarly, document identity is closely tied to the media in which the documents were originally intended. While discussing the results of our early content audit with the AO writers, we followed a link labeled "map" from one page of the AO Web site and asked the writers who had composed the annotated map that opened as a PDF document. Initially, no one was sure, and only after great discussion was it determined that the map was actually the back page of brochure that had been authored by one of the writers.

Outside of the context of the original brochure, here labeled map, the group had trouble determining precisely what the document was, and who had authored it. When they determined what document it had originally been published in, they identified the author as a member of their group, but further questioning revealed Marcia had not

illustrated the map, but had rather designed the brochure. Other writers in another department had originally created the map. Writing in the AO is not only highly contextualized, but also closely tied to original drafting and intended publication media.

Within a workplace culture that fosters an impression of writing typified by origin and intended publication, the concept of single sourcing presents a number of challenges. Adding to the tension between the CMS and the workplace culture was the fact that supporting the reuse of writing among the AO writers required implementing a new genre (meta data pane) that similarly challenged their concept of what writing is and how they should do it.

The final example of cultural conflict between the AO workplace culture and the CMS I wish to discuss surrounds the writers' expectations for WIDE's involvement in their office and the product we would ultimately deliver to them. When we began the project, WIDE's goal was to help the AO develop a more effective web presence. As we began performing early research, interviewing writers about their practice and how a web tool could better support that, we found most inquiries addressing issues of design. For instance, one writer spoke at length about her desire to individually control the style of the web pages she created. This writer's work most commonly targeted younger readers and she believed working within the constraints of an organization design hampered the rhetorical efficacy of her message. Early conversations with this and other AO writers were dominated by discussions of stylistic control over information.

This contrasted sharply with the goals we were tackling with the CMS, though. First and foremost, uniform design schemes are a widely accepted best practice among

web designers, and one of the benefits of CMSs is the ability to extend access to textual changes while limiting the ability to make stylistic changes. We looked, with our CMS, to take advantage of this ability. Looking beyond matters of style, the CMS we developed for the AO was less a web editor and more a workflow facilitator. Despite the impression writers sometimes held that we were "building a Web site," WIDE in actuality was "building a way of organizing writing."

The CMS does not reflect the distinction between writing for the web and writing for other media, nor does it afford great control over how pages are styled. Instead, the CMS uses systematized workflows and user roles to coordinate the collaborative production and retrieval of myriad documents. Much of our research was aimed at developing a system that reflected their existing practices. As such, the CMS we presented to them did not reflect their concept of web writing as style applied to existing text, but rather prompted them to reconsider the process of collaboratively composing texts independent of visual style.

The Genre Ecology

Using the workflows I created and my notes from the observations and interviews, I mapped the genre ecology of the writing system with the beta version of the CMS enabled (Figure 8). Mapping the genre ecology broadened my view of the writing system in several ways. It prompted me to consider the flow of agency through genres. When a writer uses an annotated printout to mediate an activity involving the editing pane, for instance, the annotated printout may effect a change in the editing pane, but the editing pane is unlikely to effect a change in the annotated printout. These sorts of directional

relationships illustrate the way genres mediate the work writers do, as well as the way introductions may yield innovations. When struggling, for instance, to record within the editing pane changes to a web page needed in the future, Mary innovated the genre annotated printout by printing the web page, and making notations by hand.

Another result of the genre mapping was identifying genres new to the system. The introduction of the CMS resulted in the introduction or creation of several new genres. These included the editing pane, review note, and meta data pane. Of these introduced genres, the utility of the editing pane was most immediately recognizable to the writers. This genre is also one of the more centrally located of the genres, playing a pivotal role in nearly all activities taken within the system. The meta data and review note panes were unfamiliar and located at the periphery of activities (optional actions for writers to undertake just prior to completing an activity).

In fieldwork to formalization methods of design there is a tendency to treat user innovations as signs of software failures. Using genre maps to visualize the AO writing system, however, allowed us to take a more ecological view of writers' innovations. Writing on the role of context in forming writing systems, Dourish (2004) describes practice as "a dynamic process" that "evolves and adapts" and argues that technologists should not simply, "support particular forms of practice, but to support the evolution of practice...out of which emerges new forms of action and meaning" (p. 25). Spinuzzi (2003) similarly encourages researchers to not interpret users' innovations as signs of victimizing technological failures, but instead to use them to examine, "the messiness of work, the agency of workers, and the ways the workers themselves can better be

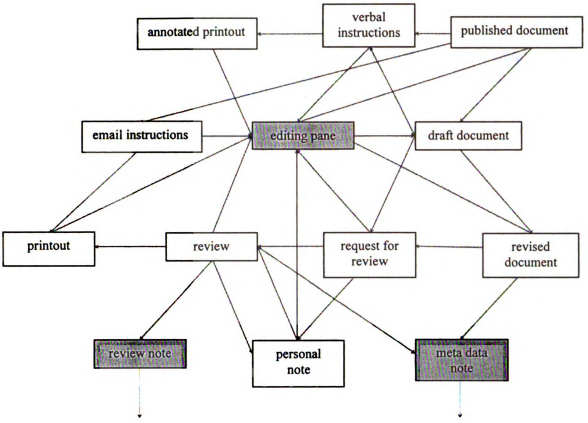

Figure 8. Mapping the genres AO writers used to complete their work allowed us to identify introduced genres and anticipate points ripe for improvisation or genre innovations. In this figure, genres shaded in gray are those introduced with the CMS.

supported in continuing to develop innovations" (p. 51).

We have embraced these ideas of writing systems, both as complex ecologies of adapting and evolving practices and as subjects of study that can help support future work. By treating innovations not as signifiers of technical failures, but rather as natural responses to changes in environment, we gain a better knowledge of how the writers are writing and the role technology plays in their practice.

CONCLUSION

The AO writers write collaboratively. They write using existing documents. They write reiteratively. They write for specific media, not for mixed use, and associate certain technologies with those media. Slattery (2007) noted writers in the business to business technical communications firm he studied, "primarily weaving new documents out of past versions of the documentation, e-mails from developers, notes taken at meetings, and numerous other sources" (p. 315). The AO writers we observed may have held similar practices, but they were not acknowledged within the organization. Instead, AO writers continued to hold onto an idea of writing that began with composing from whole cloth. The AO writers write texts and balk when prompted to write about texts. They do not consider themselves writers. They assign authorship to the originating writer. They use ad hoc workflows, and innovate unrecognized genres to facilitate their writing.

The writers I have spoken with remain wary of the CMS. Each writer experienced problems integrating their MSWord-driven previous practices with the CMS composer, resulting in varying levels of frustration. Writers appear to have very different experiences with the CMS based on technical and social situations. For instance, composing a text and submitting it to a colleague for approval results in a more positive experience than synthesizing review comments from two senior co-workers with different agendas. These differing experiences are caused by both technical factors surrounding the CMS and social ones surrounding working in the AO. Despite these challenges, the writers interacted with the CMS with relative ease. Previously unfamiliar actions were quickly operationalized to meet activity goals. The body of content in the CMS repository

grew quickly and the practices by which documents were added to the repository were recognized officially and reiteratively adjusted. The AO writers are aware of the utility of the CMS for sharing documents, although meta-data and single-sourcing techniques remain unfamiliar.

This collection of characteristics, of shared actions and intents and innovative use, reflects the messy nature of writing that previous research has tied to symbolic-analytic work in the post-industrial economy. Engestrom (2000) argues that evaluating writing as it relates to "learning organization," "knowledge management," "social capital," and other post-industrial concepts requires a willingness to accept the hybridization of writing work across disciplines and refocus our research accordingly. "They draw on psychological notions of mental processes, yet they take institutions and communities rather than individuals as their units of analysis" (p. 960). Our work with the AO supports this argument that there is more to workplace writing than the analysis of individual goals and actions. Within the AO, shared concepts about writing, and the typified practices through which recurring tasks are addressed, played a large role in how writing happened.

The suitability of Engestrom's knot metaphor for workplace writing was also evident, and complicated both study of the system and our development of a writing tool that could mirror existing system practices. It is decidedly difficult to draw specific conclusions, or even pin-point the terminus of a research project, when the subject of study is, "a longitudinal process in which knots are formed, dissolved, and re-formed as the object is co-configured time and time again, typically, with no clear deadline or fixed end point" (p. 973). The knot metaphor characterizes well the shifting of practices I

observed in response to the AO CMS, and the source of many of the emergent tensions was, as Engestrom suggests, found not in individuals and tools but in communities and shared activities.

Such complications do not relieve us of the need for writing tools that can be effective amidst the messiness of workplace writing. This project evidences that even when steps are taken to make a CMS reflect existing practices as closely as possible, changes in the writing system are bound to occur. It also demonstrates the tensions technical introductions can create within the social and cultural environment of a writing system. In the AO, I saw writers reacting to these introductions by developing innovative practices, an observation that wasn't unexpected. In arguing for an interactional rather than representational view of context, Dourish (2004) highlights the role innovation plays in contextualized writing systems. Practice, he says, "evolves and adapts," and, "our concern is not simply to support particular forms of practice, but to support the evolution of practice" (p. 25). This responsibility for supporting the evolving practice of writing can be effectively shouldered by writing researchers, particularly when we follow theoretical frameworks that take into account the fluid and community-driven nature of workplace writing, as well as the effects of innovative use instigated by cultural tensions.

By using a methodology based on ethnographic research of workplace writing, activity theory and information ecology, I was able to conceive of the AO writing system as a series of mutually constituted genres and actions that reflect and inform workplace culture. According to Nardi and O'Day (1999), "we cannot possibly expect to predict or steer all of the results of innovation" (p. 41). That statement is supported by this research,

in which the CMS inevitably destabilized the systems, creating technological and cultural tensions that writers addressed by innovating new practices, despite our efforts to create a CMS that mirrored existing writing practices. Nardi and O'Day offer as a solution the application of "human values to the development of the practices and technologies within the ecology...we think of this as using technology with heart" (pp. 211-212). Being aware of these tensions, such as the conception of web writing as textual composition that ends short of saving meta data about the text, can allow technologists to anticipate points of contention in technology use and assist users in developing innovations that relax those contentions. This research, typified in the example above, suggests that such endeavors may be at times rather one-sided. Despite our efforts to facilitate writing that reflects human values, messiness, pulsating knots, and ecological interdependency, I witnessed writers continuing to treat writing as a positivist and instrumental endeavor.

For example, when faced with a meta data system that allowed documents to be organized in relative rather than taxonomic ways, the writers simply refrained from using the meta data function. It was not until they innovated a meta data use that reflected the pre existing taxonomic structures with which they were familiar that they began employing the feature. Such occurrences do not relieve writing researchers of the responsibility to create more effective writing tools, but they do further muddy the waters in which that work must be done.

Throughout this project, we have referred to our research subjects as "writers," an accurate label because each writes as part of their work. They are also administrative directors, coordinators, assistants and workers, though, and so the writing they do is

never an end, but rather a means. The AO writers write collaboratively and reiteratively in order to share a message with their audience as effectively as possible. The role of CM in such a writing system is to help them perform this vital yet secondary task as transparently and efficiently as possible. Understanding the contexts in which they write and the cultural assumptions of the workplaces that define those contexts is a vital step in achieving the transparency and efficiency CMSs can deliver.

In the Overview, I discussed the ability of CM to facilitate the kind of distributed writing work that is characteristic of the post-industrial knowledge economy. Technologies that manage content are often thought of as instrumental tools, but they in fact are shaped by the contextual aspects of how writing happens and the culture of workplaces in which it happens. In our work in the AO, WIDE saw writing practices supported and challenged by the introduction of a CMS. These moments of support were sometimes driven by our attempts to mirror the previous system, but equally often by the instinctive innovation of new tools and genres by the writers to facilitate their work. We were able to trace the challenges we witnessed to points of cultural tension when the norms and assumptions of the workplace didn't mix cleanly with the nature of CM.

Through the process of studying the AO, we found increasingly solid evidence that the writing practices we witnessed could indeed be compared to an ecosystem. More importantly, we found that doing so helped us identify the motivations of certain actors and the effects of certain changes. Our interest in viewing the AO as an information ecology opened our eyes to the myriad effects even small changes in the system could have. It became increasingly clear to us that effective CMS design needs to take into

account the similarities between writing systems and ecosystems, and that a workplace study aimed at identifying the interconnected nuances of doing work in the AO was an ideal vantage point from which to explore that metaphor.

We also began to notice similarities between information and biological ecologies that underscore the necessity of broadening our understanding of how writing happens in workplaces. Just as the ravages the industrial age effected on our ecological landscape necessitated new studies and methods for preserving and restoring ecological balance, the post-industrial knowledge economy has placed a strain on existing information systems that calls for new and innovative ways to manage information. The development of tools and methods to facilitate that work must take into account the mutually constituted nature of work in networked environments. Recognizing the role workplace culture plays in shaping writing practices across these networked connections, and the way technology is used to mediate them, is vital to building and maintaining sustainable writing systems.

APPENDICES

APPENDIX A

MARCH 2008 SYSTEM PROPOSAL

(EDITED TO PRESERVE ANONYMITY)

SYSTEM PROPOSAL

Administrative Office
Web site Project

1. Purpose and Scope

The team has been tasked with developing a content management system to facilitate writing practices and Web site maintenance within the Administrative Office (AO). This document provides a description of the Content Management System we propose to implement. It also addresses the roles users of the CMS might assume and the responsibilities attendant to their use.

1.2 System Description and Justification

1.2.1 Intended Audience

Our research indicates that materials written within the AO have a wide audience. The primary audiences are administrators, staff, and the public. Currently, content quantity favors staff, and the project seeks to more closely address the experiences of the public. There is also desire to address indirectly a secondary audience of policy-makers and members of the media.

1.2.2 Need for a System

Along with addressing a wide audience, the AO collaborates heavily in writing practice with members of other offices. These collaborations are characterized by use of a wide range of technologies, content types, and workflow processes. Most of these practices seem to have been developed in an ad hoc fashion and seem effective. A CMS is needed to streamline these collaborative writing processes and remain attentive to what currently works.

1.2.3 Solutions the System will provide

This project will bring all contributors to the AO Web site under the same technology: a custom CMS that allows for easy, collaborative contributions to the Web site by members of the staff. Currently, AO web pages are updated by Kate using Contribute, though the content may come from any number of other staff members. Given that the AO Web site is growing, we anticipate that content needs and writing roles will grow as well. The new CMS will allow AO staff to manage established workflows and clarify currently ill-defined roles (Fig A1).

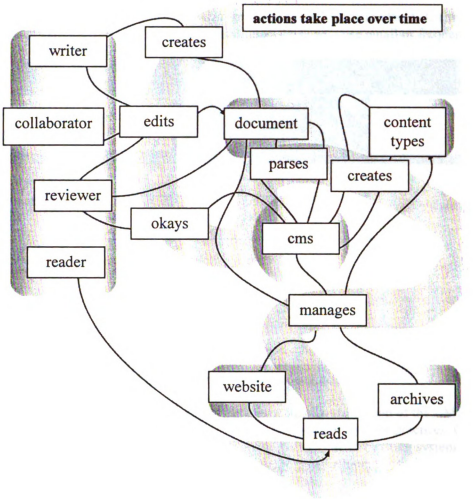

Figure A1. The system will account for groups of writers, document and content types, and the longevity of each document.

1.3 Design Overview

The system is designed to provide an easy and intuitive way for users to engage in writing work: maintaining pages on the site, adding new content, updating existing content. As Figure A1 demonstrates, the writing work of AO, like many organizations of its type, is marked by the interaction of writing roles, workflows, and mediating technologies.

1.3.1 Appearance

The system must provide a way to keep track of different types of documents, groups of writers, and sensitivities of time within one interface. As social networking systems are

adept at addressing these characteristics, the web interface that we anticipate using for the CMS shares similarities with such sites, while being strongly branded to the AO. The content submission screen will likewise be familiar to those who use email or frequent message forums (Fig A2).

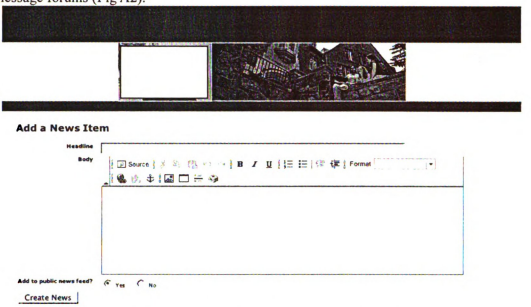

Figure A2. Sample page view for adding content.

The CMS should not disrupt existing writing practices. Ideally, the design of the CMS will integrate with the existing system so as to seamlessly support current practices. Our conceptualization of the CMS and its compatibility with AO's current writing system is based on our research of existing writing practices in the organization.

2. Functional Requirements

Functional requirements describe what the system will do.

2.1 Requirements

- Users will be able to submit content to the Web site using one technology.
- Users will be able to categorize content submissions by document type. The system will allow staff to manage the workflow for each document type.
- Users will be able to attach longevity characteristics—such as how long a document should be "public"—to each document and the system will archive or delete the document accordingly.
- Users will be able to join groups of other writers with whom they frequently collaborate on specific document types, providing a place to store and discuss documents in progress.
- Users will be able to reuse document formats and content when it is necessary and advantageous to do so.

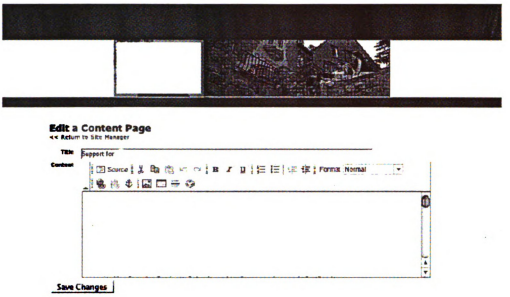

Figure A3. Sample page view for editing a content page.

3. Workflow

This section details the current and proposed workflows for publishing the description of a new seminar, with the technology used to perform each task in parentheses.

3.1 Sample Scenario: Workflow for Seminar Descriptions

3.1.1 Current Scenario

1. Staff member completes & prints seminar form (word processor)
2. Staff member submits form to Ellen (email client)
3. Ellen reviews submission with assistance (word processor)
4. Ellen returns document to staff member (email client)
5. Staff member writes seminar description (word processor)
6. Staff member resubmits to Ellen (email client)
7. Ellen pulls content for seminar scheduling and promotional materials
8. Ellen forwards pulled content to other offices
9. Kate posts description to Web site (contribute)
10. After seminar, Kate deletes description from Web site (contribute)

Throughout this process, all parties are independently tracking the longevity of the

document using existing technologies (e.g., their email) and ad hoc processes, how long it sits at each stage, when it must move, and how long it will remain relevant (multiple calendaring systems).

3.1.2 Proposed Scenario

1. Staff member completes online form (CMS)
2. Ellen reviews submission and assigns collaborators (CMS)
3. Staff member writes seminar descriptions (CMS)
4. Ellen edits seminar descriptions (CMS)
5. Other offices automatically receive pertinent content (CMS)
6. Description automatically posted to Web site (CMS)
7. When seminar is over, description is automatically archived (CMS)

Throughout this process, the CMS keeps track of the longevity of the document, automatically sending reminders to collaborators and removing the document from the Web site when it becomes obsolete.

4. Additional Considerations

Through our research to date, we have identified several additional considerations that should be accounted for in the development of the system.

4.1 Reaching Important Audiences

By making writing processes easier and more visible, the new site should assist in:

- Expanding availability of web content for the public, especially as it reflects institutional goals
- Making web content available for media and policy makers, an indirect but important audience
- Giving groups affiliated with or sponsored by AO a presence on the Web site; providing a means to establish similar areas for future groups (e.g. ad hoc working groups).

4.2 Desirable Functions

By making writing processes easier and more visible, the new site should assist in:

- Enabling inclusion of multi-media elements on the web site
- Use of forms to submit information through the Web site
- Sharing of content across offices and departments
- Providing space for event-related content that can transform as an event approaches and passes; users should be able to create pre-event information as well as provide information during and after an event
- Creation of multiple web documents from one online form submission. For example, a form announcing an event is automatically parsed to create a calendar event, email announcement, promotional flyer, etc.

APPENDIX B

JUNE 2008 CONCEPTUAL DESIGN REPORT

(EDITED TO PRESERVE ANONYMITY)

Conceptual Design Report

Administrative Office
Web site Project

1. General Information

1.1 Purpose and Scope

The team has been tasked with developing a content management system to facilitate writing practices and Web site maintenance within the Administrative Office (AO). Our most recent work has been an examination of current writing practices in the AO, and this document reports on that work in terms of our plans for a writing system for AO. The AO already has a writing system, of course, and one purpose of this report is to make that system visible. The second purpose is to outline a revised writing system—a conceptual design—for your review.

1.2 The CMS Case

Our research indicates that AO members currently use a writing system. This system is highly collaborative, but lacks a tool to more visibly coordinate and automate simple tasks such as document sharing and Web site updating. A content management system (CMS) can provide this kind of support.

The CMS should not disrupt existing writing practices. Ideally, the design of the CMS will integrate with the existing system so as to seamlessly support current practices. Our conceptualization of the CMS and its compatibility with AO's current writing system is based on our research of existing writing practices in the organization.

2. The Current System

2.1 The Current AO Writing System

Currently, the AO engages in an ad-hoc collaborative writing process, sometimes not recognizing it as such. Primary authorship is generally assigned as a function of job title or responsibility. Therefore, by "authorship" we are referring to a management function—those who are responsible for a content area. However, documents are often produced by several writers, edited by others, and reviewed and approved by still others.

2.1.1 Authoring

The AO has a number of people who fulfill an authoring role. For instance, most content on the AO Web site can be identified by a primary author (the office or project that is responsible for an area of the organization—undergraduate research is a good example). Additionally, many participants in the system coordinate content development and workflow processes, activities we have categorized as "authorial."

While preparing the grid.pdf document on the current AO Web site, Wendy acted as "author" of the document. She coordinated the production of the brochure by contacting representatives of several Organization Divisions verbally or through email, asking them to provide text. She acted as the steward of this project, keeping tabs on all the different elements.

The "author" role is important as a management and organization function, and it is a role that we will come back to later in the report when we describe what a new CMS might do.

2.1.2 Editing

The current system is revision-oriented, with writers and editors moving documents through several iterations. The language is fine-tuned, keeping various audiences in mind. Formatting considerations are also made, because moving documents and pieces of writing from their native formats to the Web presents some difficulties. For example, copying and pasting content from an MSWord document into Contribute requires adjustments in formatting. The new system will acknowledge this existing writing process, thus streamlining the formatting of content.

Ellen and Kate perform the editing role regularly, sending documents to each other for revision over email. They use the track changes application on Microsoft Word to work out the content and fine-tune the language.

2.1.3 Reviewing and Approving

Documents produced by the current system are reviewed several times throughout the process. Drafts are reviewed regularly by writers before being sent to the administrator for final review and approval to publish. Reviews may result in the return of the document to a writer for further revision, forwarding of the document to the administrator, or approval to publish the document to the Web site.

Ryan drafts a faculty profile, which is reviewed by Beth. Beth makes changes, then forwards the profile to Dan. Dan reviews the faculty profile and approves it for publication on the Web site.

2.1.4 Posting

All current posting of content to the Web site happens through one person. Access to the site is controlled by the site developer.

After an administrative team meeting, minutes are provided to Kate, who must format them appropriately for the web and use Contribute to post to new content to the Web site.

2.2 Limitations of the Current System

While the current system has worked well, there are a number of limitations that a new CMS could address.

- The posting phase—updating the AO Web site—is currently a bottleneck in the process because only one person performs this function. It may be wise to distribute this function more widely in the organization and associate with certain roles and responsibilities.
- There is currently a cost associated with making many changes to the Web site. A new CMS will allow a wider range of changes without the limitations of the current Contribute workflows and cost structure.
- The use of both email and shared drives to share document revisions between writers and editors makes revisions difficult to track and the AO runs the risk of losing its "writing memory" when it turns over staff. While the CMS may not replace AO's use of email or its shared drives, the CMS will provide AO with another shared document repository and a set of document standards, such as file naming conventions, that might enable more widespread changes in how the AO manages information and writes.

3. The New System

The current system employed by members of the AO office has been an effective tool for the office. A primary goal of the new CMS will be to reinforce the roles already in use while making it easier for the writers to fill those roles. Built to reflect the existing roles of AO writers, the CMS will systematize many of the actions already common in the AO writing community, increasing the efficient sharing and management of information and content.

3.1 Roles and Actions

People in the AO fulfill a number of different roles within the writing system. Each of these roles is associated with a set of actions. An individual may fulfill multiple roles in the course of a single project. For instance, with respect to undergraduate research content, Beth plays two roles: she is both the "author" of that content, but she is also a writer and an editor. Each of these roles have actions associated with them, some of them overlapping. These roles and their associated actions are the basis for the proposed CMS.

3.1.1 Writer

This role is one of content creation and revision. The writer researches subject matter, compiles source material, drafts documents, and reviews and revises documents. In the current system, all participants play the role of writer to some extent. Note that being a writer in this sense goes beyond being an originator and includes activities that happen before and after the execution of drafts. The new system will manage the fulfillment of that role by assigning specific levels of permission to participants.

Actions include:

- Conceptualizing content
- Collecting information
- Composing notes, outlines and briefs
- Drafting documents (B1)
- Revising document

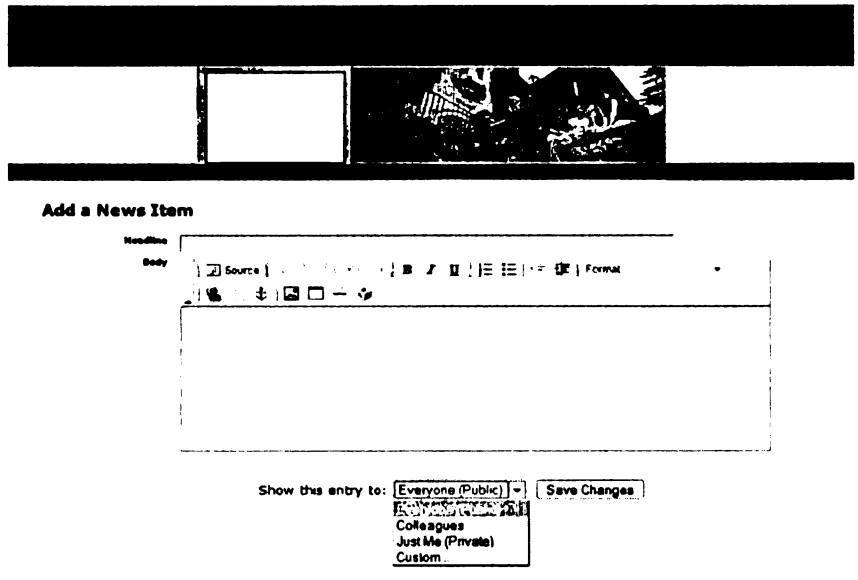

Figure B1. Drafting a document and sharing it with other writers

Note that the writer role is often played by any number of people from outside of the AO. For example, faculty submit information that AO staff use to create seminar course descriptions. These sources serve as the starting point for many writing projects. The new system recognizes the presence of these "Outside Writers" by supporting sharing of documents and identification of collaborators, but they will not be working within the AO CMS.

3.1.2 Admin

The administrator role is one of coordination, management, and endorsement. Administrators plan content, develop communication strategies, coordinate writing processes, and approve documents for movement through the workflow. All documents written in the AO office are reviewed by an administrator and either returned to the writer for revision or marked as for movement through the workflow. This action happens at multiple points in the writing workflow, and marking for approval might move a document to another writer for review, or to another administrator for approval to publish. Many of the authoring aspects in the current system will be performed by those in administrative roles in the new system— the CMS will assist writers in moving into the role of administrator when necessary.

Actions include:

- Planning and executing writing strategies
- Delegating writing duties
- Approving documents for publishing

3.1.3 Updater

The updater role may be played by any of the people who perform other roles above, or by an additional person. The updater makes the final decision to post material to the AO Web site, after thorough proofreading. This role may be played by someone already fulfilling one of the above roles, or by an additional party.

Actions include:

- Revising documents
- Publishing documents to the Web site (Fig. B2)
- Proofreading

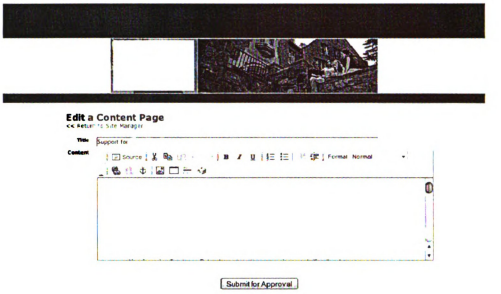

Figure B2. Publishing a document to the Web site.

4. Additional Considerations

Through our research to date, we have identified several additional considerations that should be accounted for in the development of the system.

4.1 File Naming

The AO currently relies on an improvised method for transmitting documents. Email and two or more shared drives are used to share documents between writers, with the method used in any particular case determined by the writer, role, document type or a combination. File naming systems are not standardized across the office. While currently working satisfactorily, this system could produce confusion, especially after staffing changes the introduction of additional projects to the AO. To address these potential problems, the CMS could mesh with the shared drives and facilitate standardized file naming and updating.

4.2 Document Sharing

Writing in the AO is often repurposed, and content used by one writer can often be used effectively by another as well. In the current system, affordances for this content sharing

are made intuitively by writers. The CMS can be made to anticipate and facilitate common sharing and repurposing decisions.

APPENDIX C

OCTOBER 2008 HELP DOCUMENT

(EDITED TO PRESERVE ANONYMITY)

Help Documentation
Administrative Office
Web site Project

1. Roles

There are four roles within the system, and one user can fulfill multiple roles. These roles help regulate permissions within the system, so individual users cannot access or change documents or the Web site without being given that permission.

1.1 Writer

The writer is the most basic role within the system. Every person with access to the system can write, upload, review and comment on, bookmark, and tag documents.

1.2 Administrator

The administrators approve and sign off on content to be opened up to the public outside the office.

1.3 Updaters

The updaters have the ability to make minor changes to administrator approved content and publishing it without another review.

1.4 Web site Manager

The Web site managers have control over the Web site structure and content.

2. Tasks

2.1 Writing

2.1.1 Creating new documents (Function > Write)

1. Compose and format text in available box
2. Name the document (Title)
3. Describe the document for colleagues and for reference later (Description)
4. Status of Document (Save As)
    1. Draft (private): This document will be accessible only to you.
    2. Finished (public): This document will be available to anyone in the office and will be placed in the central repository.
    3. Template: This document will be flagged as a template for use across the office as a model for that genre.
    4. Prompt

5. Adding tags (Tags) Note: The tagging system will remove all spaces and caps to make the tags as uniform as possible across the office.
    1. Project: What project is this document a part of? Type in the name.
    2. Genre: What type of document is this: a memo, letter, or course description? Type in the name here.
    3. Other: Type in a tag that has meaning to you. These tags are made for your use only, whereas the two above will help your colleagues access and understand your document.

2.1.2 Using a template (Function > Write > Find Template)

- In the writing view, click on Find Template.
- Choose a template from the list of documents that have been designated as templates.

2.1.3 Uploading Files (Function > Upload)

- Browse and find the file you wish to upload on the computer and click on it.
- The system automatically fills out file name, type, and size for you, but you need to fill out the draft status (private draft or public and finished), title, and description of document.
- You have the option of filling out tags, requesting a review, and adding a comment or bookmark.

2.2 Editing

Editing is essentially the same as writing, with the exception of Revision Notes.

2.2.1 Revision Notes

- When revising you need to include notes about the changes you make in a document that will alert others as to those changes.
- You can also rename or edit the title, document description, and draft status (public, private, template, or prompt) when revising a document.

Note: This system encourages reuse by keeping track of changes made. When making adjustments to a document, the system follows these changes and never replaces the file but creates a new file with the amendments. So earlier drafts can be recovered and documents can be used to make completely new documents.

2.3 Finding

2.3.1 Tagging Documents

Note: Tags can be used for both personal and interdepartmental use. For better overall department access and usefulness of tags, keep tags as uniform as possible.

I. See section 2.1.1 "Adding tags" above
II. You can access your tags when you log in. When clicking on one of the tags, you will be shown a list of all the documents you have labeled with that tag. **(My Tags)**

2.3.2 Bookmarking Documents (Document > Tools: Add Bookmark)

1. When viewing a document, you have the option of adding a bookmark and annotation. The annotation serves as notes to yourself about what you found/find useful about this document.
2. You can access your bookmarks when you log in. When clicking on one of your bookmarks, you will be taken directly to the document. **(My Bookmarks)**

2.4 Reviewing

Note: Everyone has the ability to write, edit, find, and request reviews for documents for use within the office. However, for documents to be viewed outside of the office by the public (such as on the Web site) it must be reviewed and approved by an administrator.

2.4.1 Requesting a review (Document > Review)

1. When viewing a document, click on the review tab and then request a review.
2. Designate who you want to review the document (Document > Review > Request a Review > Review Type).
    1. Administrator: everyone with administrator abilities will be notified that there is a document for review
    2. Colleagues: you can name a specific colleague to look over the document. The colleague could be on staff within the office or a colleague that does not regularly have access to the system, an external member. In the text box provided type the name or e-mail address of the person you wish to review the document.
3. Write a note to the reviewer explaining the document and request for review. Here you can point to specific instances in the document where the reviewer should focus their attention, explain the latest revisions to the document, or ask questions of your reviewer.

2.4.2 Commenting on a document (Document > Comment)

By clicking on the comments tab in the document view, you can write comments that will be seen by everyone who views the document. Each comment will be displayed with your name, the time, and the date of post.

2.4.3 Notification to review document (Destinations > Review)

When selected for a review, a notification with a quick link will appear under notifications for you. **(Destinations > Notifications)**
You will also receive an e-mail with a link to the document.

2.4.3 Tracing history of document (Document > History)

Under the history tab when viewing the document, you can view the changes and editors over the history of the document.

3. Multiple Uses of System

This system is not just for managing Web sites. It serves as a portal to facilitate collaboration on office writing. The **Activity Aggregator** allows office members to witness the writing that is going on all the time in the office and perhaps identify documents and pieces of writing that can be reused in other unforeseen ways. The **Writing Repository** stores all the writing done in the office in one central location where the whole office has access to it at any time. This is a rough outline of the way the system is meant to function, but you can use the system any way that works for you.

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