Analyzing The Effects Of Single-sourcing Methodologies On The Role Of The Technical Communicator

2006

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ANALYZING THE EFFECTS OF SINGLE-SOURCING METHODOLOGIES ON THE ROLE OF THE TECHNICAL COMMUNICATOR

by

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B.A. Florida State University, 2002

A thesis submitted in partial fulfillment of the requirements
for the degree of Master of Arts
in the Department of English
in the College of Arts and Humanities
at the University of Central Florida

Summer Term
2006

ABSTRACT

This thesis discusses the specific effects of single sourcing methodologies on the role of the technical communicator, his or her job responsibilities, qualifications, collaboration with coworkers, employee and employer expectations, and the effects on career progression. The methodologies discussed included all types of single sourcing methods for technical documentation (such as XML-based), advanced and non-advanced Content Management Systems (CMS), and Digital Asset Management (DAM) systems.

Other topics explored are an overview of single sourcing for technical documentation, a comparison of the "craftsman model" to the current trend of single sourcing and structured content, specific effects on technical communicators such as role changes, the effects of incorporating XML into a technical communicator's daily work environment, and the effects of other emerging technologies such as advanced CMS and DAM systems on technical communicators.

General findings include that the practice of single sourcing, whether a positive or negative development, has continued and likely will continue to increase in technical communication groups within organizations. Single sourcing, especially for dynamic, customized content is also increasing because of the current marketplace, but works best via the use of a CMS and other systems used by large organizations. Single sourcing is also best implemented after extensive strategic planning and training of employees. Many technical communicators will have to accept new roles and positions, the direction of which is greatly impacted by the extent of their skills.

Recommendations are made for additional research on the effects of single sourcing implementation on the technical communicator, and how to adapt to changes. Additional research is also needed on XML, DITA (Darwinian Information Typing Architecture), and DAM systems, all related specifically to technical communication.

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CHAPTER ONE: INTRODUCTION

Overview of Single Sourcing*:*

One of the most talked about topics in the field of technical communication over the last five years has been "single sourcing." The Society for Technical Communication defines single sourcing as "using a single document source to generate multiple types of document outputs; workflows for creating multiple outputs from a document or database source" <Society for Technical Communication Single Sourcing Special Interest Group web page, http://www.stcsig.org/ss/>.

Single sourcing is needed in technical communication because of a "lack of standardization" that exists in the documentation and content of many organizations, thus making information very difficult to reuse (Junco & Bailie 2004). Single sourcing reduces the amount of re-creation and allows for the easier sharing of information between departments, creating consistency and eventually providing the opportunity for cost savings and increased quality (Steele 2001 and Hackos 2002). Three basic reasons for single sourcing, as stated by Kurt Ament (2003), are saving time and money, improving document usability, and increasing team synergy (Ament 8).

According to Ann Rockley (*Content & Complexity, 307-310*), there are three levels of single sourcing:

1) Identical Content, multiple media

2) Static Customized Content

3) Dynamic Customized Content

Organizations have been practicing Level 1 of single sourcing for "a number of years" (Rockley, *Content & Complexity* 308). An example of Level 1 would be the conversion of a print user guide into online help or a PDF document via Adobe Acrobat. Usability for this type of single sourcing is poor, because information suited for one type of output is not necessarily suited for another (Rockley, *Content & Complexity* 308).

Level 2 of single sourcing is geared at customizing information to meet the needs of the user, the type of materials to be developed, and the output media. In this level, the source is not altered. Rather, things are added to make the content usable in other formats (Rockley, *Content & Complexity* 308). Some examples of this level of single sourcing are multiple media output, multiple platforms, product families, multiple information products, multiple audiences, multiple releases, and integrated documentation and training (Rockley, *Content & Complexity* 308). Many of these examples of single sourcing are practiced frequently by numerous companies and organizations, thus making Level 2 the most common type of single sourcing.

Level 3 appears to be the fastest growing methodology of single sourcing, and it is also the most intriguing. In Level 3, content does not exist as a document, but in a series of information objects assembled by the user. This level of dynamic single sourcing allows the user to pick and choose which information he or she wants to view, and requires a "dynamic content

engine" (Rockley, *Content & Complexity* 309). It also requires "detailed information models" so the content engine can interpret the customer's needs and assemble the document specifically for them. The building of information models, to be discussed in great detail later in this thesis, is essential to this particular methodology of single sourcing. As Rockley states, "Each increasing level of single sourcing brings with it increasing levels of complexity in the structure of new information, and therefore the information models as well (*Content & Complexity* 310)." In order to deliver dynamic and customized information to end users, technical communicators must learn how to write modules of structured content using XML and similar technologies. This is a recent and innovative type of writing that is changing the shape of the technical communication field, but also in best-case scenarios, allowing product users to more easily find and access the exact information they need.

Rockley and several other researchers who have published work on single sourcing (Hackos 2002, Ament 2003) believe that information models are essential to success in implementing single sourcing. Kurt Ament states that "If your content is modular, your single sourcing project succeeds. If not, it fails" (Ament 3).

The hypertext language XML (Extensible Markup Language) is another important part of single sourcing, especially in Level 3, where it is the "technology of choice." Rockley asserts that XML is not necessary for single sourcing, but it facilitates it (330). Numerous researchers on single sourcing "assume the use of XML and a content management system" (Williams 321). I plan to discuss the issues of XML and content management systems (CMS) with single sourcing

in more detail in later chapters.

Digital Asset Management (DAM) is another technology I plan to discuss in this thesis. DAM is an emerging field that is becoming more and more relevant to technical communication. Technical communicators that work for companies who do a lot of advertising or have a need to store large amounts of images, audio and video files, and other types of digital assets will need to understand these system as they may be called on to use or even manage them. DAM systems are very similar to single sourcing and content management systems (CMS). This will be explored in more detail in Chapter 5.

Some of the key research questions I hope to answer or gain insight on during the completion of this thesis are: How can the implementation of single sourcing affect the role of the technical communicator in his or her organization? How does XML or DAM specifically affect the job and role of a technical communicator? Are the craftsman model and other traditional documentation methods becoming obsolete and how does single sourcing contrast to these methods? What topics related to this thesis need additional research and what conclusions can be made on single sourcing and technical communication after the completion of this thesis?

The following section describes what will be discussed in the remaining chapters of this thesis:

Preview of Chapters 2-6

In Chapter 2, I will discuss the "Craftsman Model", as named by Michael Albers, and the

difference between technical communicators' role in producing print and World Wide Web documentation now, compared to in previous years or with companies that have not yet implemented single sourcing and structured content.

"Structured content" is the type of content created during the practice of single sourcing. Information is structured, and broken down into chunks of information, in order for it to be easily reused later. This is a very different way of authoring content than the traditional, "craftsman" model that has been widely used in the technical communication field.

The "craftsman model," where writers produce a succession of hand-crafted documents, is becoming obsolete according to Michael Albers (*Technical Communication* 2003). This method of technical documentation is performed by each technical communicator writing, editing, and producing his or her own deliverables. One of the main reasons why the craftsman model is becoming obsolete is because it makes information difficult to standardize and reuse. When writers author their own document without collaboration or without borrowing from each other, the result is a lot of the same information, instructions, names, and procedures being described using varied terminology and facts taken from different sources. The varying information contained in documents written via the craftsman model also creates additional work during the editing process.

Unlike a single sourcing and structured content environment where writers pull standardized content from a repository and all instances of the same information are consistent, the craftsman model is where the writer "not only writes in his or her style using his or her own

approach or methodology, but also individually optimizes the presentation of the information. As a result, it often contains information better presented elsewhere, may contradict other parts of the documentation set, or may contain information learned in a hallway conversation that no one else knows" (Albers 336). This traditional method of technical writing can confuse the end user, negatively affect the usability of the product, and generally make the documentation process more difficult for all those involved, including the documentation team.

Instead, organizations that employ technical communicators are moving towards a concept of engineered documents via single sourcing. Albers believes that single sourcing calls for specialization based on the new or expanded tasks that come with its advent. He also promotes redefining junior and senior writers' responsibilities in the workplace, with most of the specialization delegated to senior writers (Albers 335-37). Albers notes that XML has been a successful tool for creating documents with multiple outputs, which is a major type of single sourcing. However, he maintains that these success stories are not based on working with information that gets "dynamically changed on the fly. The text itself, once assembled, is basically static." (Albers 337). Albers writes that while single sourcing and XML make it easier to deliver dynamic information, single sourcing and XML can also result in the continuation of the craftsman model when writers become XML experts handcrafting blocks of data (338). Like several other researchers who have studied single sourcing (Clark, Sapienza), Albers values making information useful and easily accessible for the end user over any benefit gained by the writers or their organization. The combination of XML and single sourcing will be discussed

more in-depth in chapter 4.

Some researchers on single sourcing have taken a decidedly negative viewpoint, such as Robert Kramer (2003) and Dave Clark (2002). Kramer states that single sourcing can force the writer to develop skills that are traditionally in the realm of computer science and jettison traditional writing technique, "the heart and soul of most technical writing theory (328). While he admits that single sourcing streamlines some processes and helps produce documents that could not normally be produced, Kramer believes that single sourcing causes a lack of separation between writer, editor, content developer, and technical expert, causing the technical writer to be a generalist, capable of many tasks but not a specialist or expert at any one thing (329). Kramer even adds that, many times, the move to single sourcing is unnecessary: "often a result of an industry requirement to meet a documentation goal rather than an evolution of the writer's craft toward ease and simplification" (333).

Clark (2002) seems to be against the move to single sourcing because he writes that the practice of automation and the structured authoring of content "devalues human work" and privileges systems over the user. He also believes that the chunking of information is emphasized more than the editing, and not enough attention is paid to rhetoric when producing single-sourced documentation (Clark 20-23).

It is safe to say that not all researchers and professionals in technical communication are behind the move to single sourcing. Chapter 2 of this thesis will delve into the specific differences between the traditional methods of documentation and compare them to recent single

sourcing methodologies.

Chapter 3 will continue on with the topic of the effects of single sourcing on the technical communicator; however, it will go more in-depth on how single sourcing specifically changes the role of the technical writer, and how it impacts the job qualifications, collaboration with co-workers, expectations, and the general nature of a technical writer's position in a single sourcing environment.

Locke Carter asserts that single sourcing puts pressure on technical writers. He wonders what writing will be like "when writers don't really write any more, but instead develop content" (317). Carter believes that single sourcing is itself a technology, and just like any other technology, writers must adjust to radical changes. However, with single sourcing, there is also the fear of writers being disenfranchised or even losing their jobs.

According to Carter, there is the possibility that single sourcing creates a new kind of writer, "one who is more integrated than before" (319). In other words, writers may be required to obtain and use more skills to retain the job description of a technical writer. The separation of skill sets in the workplace is another possible consequence of single sourcing, where writing may become "de-coupled from information design, from layout, from grammar" (319). This idea goes along with the statement that, in single sourcing environments, writers may be more aptly described as "content developers."

There are positive and negative effects of single sourcing in regards to the role of the technical writer. Ann Rockley states that single sourcing is not possible without the structuring

of content. According to Rockley, when the structure for writing something in the workplace is standardized, then writers can focus more on the content, not how it is put together (*Technical Communication* 350). However, there is often resistance to single sourcing and structured writing when writers feel they will lose their creative control. Rockley admits that authors do lose this control in some single sourcing environments, but those writers that enjoy layout and design may have the opportunity to design templates and style sheets instead of authoring content (*Technical Communication* 351). This type of transition is exactly the type of effect single sourcing can have on a technical writer, a complete role reversal, from one who writes content, to an information designer.

Because of these implications and possibilities, it is more imperative to examine how technology such as single sourcing is integrated in our field, and how it affects the daily processes, the products, and the perception of individual and organizational relationships (Carter 320).

Chapter 4 will discuss the emergence of XML as the primary enabler for single source and structured content, if and how much technical writers should be proficient in XML, and how it can be used to design and manage single sourcing systems. XML is considered to be the standard tool for creating single-sourced documentation. Williams (2003) states that most of the authors cited in his research assume the use of XML and a Content Management System (CMS) for single sourcing (Williams 321).

I plan to discuss XML and the theories that have made it an integral part of single

sourcing systems, but not the full extent of issues surrounding XML. The goal is to explore these issues and produce findings and conclusions that put all the issues in a comparative and related context, making helpful statements about single sourcing that benefit both professionals and students in the field of technical communication.

Albers notes that XML has been a successful solution for creating documents with multiple outputs, which is a common goal of single sourcing (Rockley's Level 2). However, Albers maintains that these success stories are not based on working with information that gets "dynamically changed on the fly" (337), as in Rockley's Level 3. He also notes that merely becoming an expert in XML can result in continuation of the craftsman model, and that many of those with technical expertise do not possess the skills in information and presentation design that technical writers have (339).

Saul Carliner (2001) specifies that "the emergence of XML further facilitates the re-use of information, but adds a layer of technical complexity" (157). Carliner's belief is similar to the claim made by and other researchers (Clark 2002, Kramer 2003); although Carliner is different in that he encourages technical writers to evolve with the future path of the profession.

From all indications, XML is a very positive thing for the creation of well-defined online documents, and for any organization implementing single sourcing. XML should continue to be relevant for structuring and organizing content, as long as it does not become obsolete like so many other computer languages have in the past. Technical communicators in the field who dislike the changing of their role in the workplace and the requirement that they learn new skills

and tools such as XML may view single sourcing as a negative. However, technical communication professionals have been advocating that they learn XML to not only help them retain their positions by keeping up with new technology, but also as an opportunity to contribute even more to organizations in the areas of single sourcing, content management, and document design.

Chapter 5 will explore other emerging technologies related to single sourcing and how they fit into the overall methodology in some organizations, how they benefit the field, and the extent of technical communicators' present and future involvement in the use of these technologies. Some of the technologies that will be discussed are Digital Asset Management (DAM) systems, and advanced Content Management Systems (CMS).

Like the practice of single sourcing and content management systems, Digital Asset Management (DAM) is an emerging field for structuring, organizing, and categorizing digital assets, which include "everything from artwork, logos and photos to PowerPoint presentations, text documents and even e-mail" (Ross 1999). In the same way as a Level 3 single sourcing initiative would be organized, DAM involves:

- Creating an efficient archive that can hold digital resources (such as images, audio, and text) and the metadata that describe them;
- Implementing an infrastructure to ensure that these electronic data are managed and preserved in such a fashion that they will not become obsolete;
- Implementing search facilities that enable users to identify, locate and retrieve a

digital object

Source: (NINCH- National Initiative for a Networked Cultural Heritage 2002).

Metadata will also be discussed in more detail in Chapter 4 (along with Ch. 5), because the use of metadata, and the "granularity" of said metadata, is important in the creation of XML code for Single Sourcing, CMS, and DAM systems and databases (Hackos 2002).

DAM systems are very helpful in reducing the amount of information that is lost by an organization. Ross notes that "the average creative person looks for a media file 83 times a week and fails to find it 35% of the time" and that research has shown that DAM "solutions" can reduce that figure to only 5% (Ross 1). DAM is related to single sourcing and content management because it helps make data, information, and digital media easier to access, saves time, and reduces costs in reproducing work that already exists. Numerous large corporations are now using DAM systems to keep track of massive amounts of images and documents.

Ross suggest that, during the implementation of a DAM system, communicators map out the workflow of their imaging and storage processes, and determine who the users will be and what they need to see on the screen to complete the task they are working on (4). This is very similar to what several experts on single sourcing have advised and can be applied to single sourcing and content management. Just as organizations want to be able to reuse effective documents via single sourcing, more and more DAM systems are being created because of the "growing belief that digital resources are, at the very least, as valuable as the time, effort, and finance that have gone into their creation" (NINCH 2002).

Advanced or full-fledged content management systems (CMS) are generally used by large organizations that work in the field of technical communication. Single sourcing, via an advanced CMS, has shown that it can lower costs and increase quality and efficiency (Hackos 2002, Junco & Bailie 2004, and Albers 2003). CMS have also proven to be effective for producing documents that need to be translated to other languages, and for producing documents in a wide range of formats and document types (Hackos 2002, Kramer 2003, Sapienza 2004, and Steele 2001).

The final chapter of this thesis, Chapter 6, will include the findings of my research and summarize them in a context valuable to technical communicators. I will also present my suggestions for the direction of further research on this topic and point out areas that lack a significant amount of published research.

The practices of single sourcing, content management, and DAM are expected to continue to increase in the coming years. There are more documents created every day, many of them being placed on the World Wide Web. Also, there are more devices and new technologies created every year that could potentially become another "output format" that text and images will have to be compatible with to support the growing consumer market.

Most scholars and professionals that have written about single sourcing also agree that single sourcing requires more collaboration between writers, more planning and focus on how the roles of technical communication are altered, and more thought on the best practices of implementing single sourcing. However, there is controversy concerning how single sourcing

affects technical communicators and their field, and whether the move to single sourcing, content management, and DAM is a positive thing for technical communicators involved in these initiatives and methodologies of creating products. I plan to explore both sides of the story and draw conclusions from several areas to make informed statements on the specific effect of single sourcing on the technical communicator.

To understand how the move to single sourcing affects the technical communicator, we must understand how exactly the field is evolving, and why these new methodologies of using databases, structured writing, and information models are so drastically different from the traditional form of technical writing. As Rockley states, “a single sourcing initiative brings with it changes to the way people work” (*Technical Communication* 350). Is the move from the craftsman model to single sourcing and structured content for the best? In the coming chapters, I will investigate the opinions of researchers on this subject in the goal of obtaining helpful insight for technical communicators.

CHAPTER TWO: PRODUCING TECHNICAL DOCUMENTATION- PAST VS. PRESENT

Single sourcing is an innovative method of producing technical documentation that has only gained popularity within the last decade. According to Carter in 2003, “it has rapidly evolved from being a futuristic vision of the field only a few years ago to a realistic document practice that is practical for writing shops of all sizes” (317). While the “practical for writing shops of all sizes” statement may be debated by other researchers on this subject, there is no doubt that an increasing number of organizations are currently moving towards single sourcing and structured content.

The current shift towards single sourcing in the field of technical communication can be compared to the era when desktop publishing and personal computing were adopted in the 1980s (Carter 319). In that era, the model shifted from writer, layout designer, typist, editor, and printer to an environment where one or two writers could do it all. Typists were either fired or offered a chance to re-train for word processing. Carter (2003) states that the shift from writers producing individual texts to single sourcing “holds the likelihood of similar upheaval” (319). To understand why and how the shift to single sourcing and “structured writing” could produce such controversy and upheaval, it is imperative to realize how drastically different the method of single sourcing is from traditional technical writing.

The "Craftsman Model" and Traditional Documentation Methods vs. Single Sourcing

The craftsman or "craftsperson" model, as explained by Michael Albers (2003) is where each writer handcrafts text and makes "their own content decisions about writing, editing, and layout of their book, within the limits of company style guidelines," creating content "as a whole entity" (335). In this model, writers have substantial control. They "design and write content for their own deliverables, edit their own work, and create their own deliverables (Bottitta et al 361).

It is understandable that some writers would enjoy this type of creative control over their work and not want to share responsibility (and recognition) with multiple writers. However, it is also easy to see how some researchers believe that the craftsman model and other "traditional information delivery techniques" "are fast becoming archaic in the frenetic press of new developments" (Sakach, Kennedy, and Devine 451). As stated in Chapter 1 of this thesis, the craftsman model is starting to become obsolete because it makes information difficult to standardize and reuse. Ament states that, in the traditional documentation process, "at best, re-use involves extensive rewriting" (4). The lack of standardization and instances of multiple documents conveying different information about the same thing can also confuse the user of the product and result in poor usability. The craftsman model is also becoming obsolete because of the increase in different output formats for information. Single sourcing allows for easier dissemination of information across a wide range of formats. In the craftsman model, a document that was created for print media must be rewritten or reformatted to be used online or for another

output format.

Despite the rise of single sourcing and structured content, Albers states that “technical communication is still very much a one person operation.” In the craftsman model that he describes, each body of work “has an individual stamp, no matter how hard companies try to ensure consistency through the use of style guides” (Albers 336). However, single sourcing is being pushed by an increasing number of organizations to correct the problems with the craftsman model when dealing with documents on the same subject or a similar topic: different sentence structures, different levels of detail, varying quality, and overlapping details between modules (Albers 336).

The traditional documentation process can also create a “silo effect,” where the “lack of shared information results in creating and recreating same content for different purposes, sometimes complete duplication of a single document by multiple authors” (Junco and Bailie 207). The duplication of information is the type of problem that most organizations believe needs to be fixed immediately because it takes up time that a writer could spend creating new documentation. This quandary is also described by Junco and Bailie as a “communication gap” where authors are not aware that content was available elsewhere before they recreated it themselves (207).

When knowledge and information is stored in a single sourcing database or Content Management System (CMS), it allows it to be shared much easier. Williams asserts that “the greatest loss associated with information stored in proprietary formats is that it cannot be shared

among organizations" (322). In the craftsman model, if one department in a firm wanted to use information created by another department, it would have to copy, paste, and reformat the information. This method is also used when an existing document needs to be updated. The editing or reformatting of information can be described as the "hand-tweaking" of information. When this method is performed, "each and every time the content is used, it must be 'tweaked' again" (Rockley, *Technical Communication* 351). The frequent changing or "tweaking" of information also provides more opportunity for errors and inconsistency between related documents. Single sourcing advocates say that this time-consuming process can be avoided by making information accessible for reuse via a document database (Williams 322).

Updating single sourced documents is less involved than traditional documentation because the technical communicator does not have to copy and paste the updated information into each document that applies. If a single sourcing system is set up, the writer can:

> Pull in that content from a repository and use it in other documents and files, but still maintain the reference back to the source chunk in the repository. This way updates can be made to all content and then be propagated throughout all instances where that chunk of content is reused (Taylor and Petelin 4-5, Steele 142).

The "silo effect" and other problems of duplicating information often result in a lot of wasted time, money, and resources--never a good thing for any business. Williams also notes that avoiding copying, pasting, and reformatting decreases the risk of error (322).

Many organizations are switching from the craftsman model to single sourced and

structured content because of the necessity of providing dynamic and customized information to users. Content for "customized access" requires the information to be created and shaped in a certain way (Albers 335). According to Albers, "producing effective information with single sourcing simply cannot happen with several people each working on their own sections and putting them together" (342). With the increasing demand for customized access and dynamic information available in a variety of formats, the craftsman model may become more and more obsolete and single sourcing could become necessary for even more organizations. For organizations to be successful in this transition, they must be able to leverage their "information analysis and design expertise to ensure effective information communication" (Albers 342). One way that organizations can make a smooth transition is to spend more time studying (before the creation of the product) what the audience needs and by figuring out the best way to design the information for the specific output format required.

Before one begins to develop information for a documentation project, whether using the craftsman model or a single sourcing methodology, one identifies his or her users, the types of information they need, and the types of documents that best communicate the information. There may not appear to be much of a difference between the traditional documentation process and single sourcing but, "once you begin to develop information, however, the difference between single sourcing projects and traditional projects becomes dramatic" (Ament 23).

Traditional writing relies on a process of creating documents in a sequence, with a predetermined hierarchy of what sections are of more importance. In addition, the traditional

writing process constrains the document or product to a particular format or genre (Sapienza 399). Writing for single sourcing assumes nothing- "you build stand-alone content modules that make sense in any document format or reading sequence" (Ament 5). As other researchers have stated, writing modules of content that are compatible in any format is obviously a more complicated and time consuming task than writing in the craftsman model. However, the additional time spent on single sourcing the documents, writing once to reuse many times, is usually made up later by avoiding extensive rewriting and reformatting of information for different purposes.

Single sourcing involves the creation of "content for different audiences, purposes, and formats," writing content in modules one time, and then assembling the content into several different documents (Sapienza 399). In traditional documentation, files consisting of chapters and sections are assembled to create a document. In single sourcing, materials coming from a single location and consisting of information objects are assembled to make information products (Rockley, *Content & Complexity* 307). When writing for single sourcing, technical communicators must keep in mind that what they write likely will be reused later in a variety of documents and formats.

The storage and presentation of content are identical in traditional writing settings but, in single sourcing, the writer does not immediately see the completed form of the document (Sapienza 402). Because of this situation, writers "must divorce themselves from the idea that they are in control of every widowed or orphaned line of text or every awkward line break" when

creating single sourced or structured content (Yeats and Hull 253). Skill in visualizing information in its completed form (because they often do not see what it will look like while they are writing it) is also something that should be valued more in technical communicators that write using single sourcing methodologies. Kramer states that the most effective writers (in single sourcing) "can visualize where and when bits of information exist in a networked system of shared files" (334). These are fundamental differences in production that impact the way projects are completed and the way technical communicators perform their job.

The Shift to New Methods of Creating Information Products

The explosion of information and documents on the World Wide Web appears to be changing the way knowledge is delivered to end users and consumers. The result is that we, as communicators, often "don't have time anymore to write chapters, paragraphs, sentences to provide whole context for people: we give out information in chunks" (Anklam 41). Of course this situation is not always true, but the recent advent of modular writing and single sourcing, which "involves chunking, labeling, and linking," supports this theory (Ament 6).

Using "object-oriented or relational object databases," (databases consisting of XML-based structured content), technical communicators using advanced single sourcing methodologies transform their information into "sets of discrete objects, some as small as glossary terms or product numbers, some bite size (procedure steps), others more filling (a whole procedure)" (Price 200). These "objects" are written in content modules rather than chapters or

sections. This is just another explanation of how different writing for single sourcing is from the traditional documentation process.

Consistency of style, grammar, and terminology are important in single sourcing, but the *structure*, the tagging of objects, the linking of information, is what makes single sourcing possible (Rockley, *Technical Communication* 350). In single sourcing, information design plays a larger part than it does in traditional technical writing. As Price states, "exploding our legacy documents into distinct tagged objects" makes information easier to reuse (200). It also allows information to be shared within organizations more easily.

To reiterate how many other things there are to consider with single sourcing, Yeats and Hull (2004) note that "instead of just writing and publishing content for the sake of content itself, technical communicators who single source now have the overhead of analyzing how content must be chunked and designed most effectively for reuse" (252). This overhead changes the way documents are written, because in single sourcing environments, writers now have an additional aspect of the job to consider--how something they write can be effectively re-used later.

Other things to consider with single sourced documentation are metadata ("data about data") and the effect on translation costs- costs incurred producing "multiple versions in multiple languages" (Hackos 298). Although metadata will be discussed in more detail in Chapter 4, it has a much more prominent role in single sourcing and structured writing than in the traditional process. As Rockley states, "Metadata allows content to be retrieved, tracked, and assembled automatically" (Rockley, *Content & Complexity* 322-323). Metadata is also a major factor in

creating XML-based single sourced content, because it helps enable content to be re-used more easily. Hackos (2001) also notes that establishing metadata and the "granularity" of said metadata is a crucial part of developing a single sourcing and content management strategy.

Companies that translate documents have saved millions by using a Content Management System (CMS) "that provides or connects with a lingual database" (Steele 143), not only saving money for the company, but saving a lot of time for the technical communicator in producing documents that need to be translated. In general, a CMS can help store, organize, convert, and facilitate easy retrieval and reuse of information, among other benefits. However, a lot can depend on how advanced and what type of CMS is used. Some CMS are reasonably priced (a few thousand dollars), while the most advanced systems can cost upwards of $200,000 (Steele). Technical communicators could be the employees proposing a CMS to management in some organizations. Williams argues that "technical communicators will have to think critically before proposing solutions that can prove as disruptive as implementing an elaborate CMS" (326). Because it can be a very expensive venture and such a big change in how things are done, technical communicators "will have to think like managers or risk their credibility" according to Williams (326).

Implications of Single Sourcing for Users and Usability

Proponents of single sourcing seek to solve the problems with the craftsman model and further facilitate customized access for users. However, it may not be that simple. Dave Clark

(2002) believes that single sourcing is many times implemented without concern for the users or rhetorical benefits. Since single sourcing involves the chunking and standardization of information, many times consideration of context is lost, according to Clark (23). Kramer (2003) echoed this view, writing that "single sourcing is often a result of an industry requirement to meet a documentation goal," although he used this statement to point out that single sourcing does not necessarily make things easier for the writer (333).

Clark writes in his article that creating quality content that is rhetorically effective for the user should be the goal of technical documentation. I agree that this goal should be of the utmost importance; however, it should be noted that efficiency, cost savings, and reduced time spent on clerical tasks is something that is very beneficial to an organization and its employees as well.

Some researchers, such as Filipp Sapienza, believe that single sourcing does not negatively affect the user. He explains that in a traditional craftsman model, a technical communicator creates content "based on suppositions about the audience and user demographics." However, in single sourcing (especially using XML) the user may be able to be the "co-creator of a dynamic and changing system" (Sapienza 399). While this claim may seem presumptuous and unrealistic to many, the concept of end users being able to dynamically create the content they desire and need for what they are trying to accomplish should be very intriguing to both writers and the end user, and something to strive for if the shift towards single sourcing continues. Users can already pick and choose which content they want to view in many interfaces created by single sourcing and structured content methods. Pushing the envelope

further to provide even more opportunities for the user to organize and view dynamic content is the logical next step in the process of creating technical documentation.

Single sourcing and CMS have also proven to be very beneficial to the users in various situations. In large online help systems, it is often difficult for users to find information (Steele 141). Single sourcing and content management systems can make it easier for users to access the content they need to perform the task they are working on. Also, when users have a question or send an email to support staff for help with troubleshooting and other issues, "instead of having to draft a new email message for every correspondent, the writer can draw on previously created objects- boilerplate modules- to expand the replies" (Price 201).

Another usability issue is the way usability tests are conducted. Traditionally, an extensive user test would be conducted at the end of the process, after the document has been created. Single sourcing uses smaller tests throughout the development process (Sapienza 399). Changes in usability testing are important because it is a different order and process of creating products, and yet another thing for technical communicators to be prepared for in the move to single sourcing and structured content.

Sapienza also believes that to achieve a high level of usability in an information product, "it requires the integration of multiple knowledge areas, including rhetoric, information architecture, usability, and computing" (407). These "knowledge domains" naturally overlap and "implicate the other" during the process of creating information products. However, Sapienza asserts that because of this reason, "one cannot claim that the 'craftsperson' role of

technical communication is endangered by such technologies" as Albers claims (Sapienza 407). Modular writing is also described by Sapienza as "a deliberate and highly skilled process that is at the heart of any craft" (407).

These statements by Sapienza are thought-provoking but also somewhat puzzling, in my opinion. I do not believe that Albers and others who speak of the craftsman model in technical communication mean that modular writing for single sourcing will not involve a highly-skilled process or "craft" performed by writers and other employees involved in the projects. Unless writers become as adequately skilled in the knowledge domains such as information architecture and advanced computing as they are in the application of rhetoric and usability, they will seemingly be working together with co-workers that specialize in a certain area of the production process.

Those technical communicators that become proficient in all areas of knowledge required for modular writing will be "craftpersons" in a sense. However, I am skeptical that technical communicators who achieve this level of broad, proficient skill would be the majority in the field. While certain "crafts" will likely remain, as will the "'craftsperson' role of a technical communicator" (Sapienza 407), I agree with Albers and others that have written about single sourcing that the craftsperson *method* of hand-crafting documents from start to finish by one writer, editing and producing their own deliverables, is on the decline and becoming obsolete.

Single sourcing and the delivery of dynamic content to users is quickly becoming a necessity for organizations and information providers that want to compete in today's

marketplace, especially large firms. Users are starting to expect dynamic, quality, and highly usable content and a lack of it may cause them to go elsewhere, a realistic fear considering the explosion of documents and information available elsewhere via the World Wide Web and other modes of communication. The ability to provide this type of content may come from different ideas such as specialization or the increased definition of job responsibilities in the writing group (Albers) or from the acquisition of new skills such as XML proficiency by technical communicators. Whether one of these methods are used or another is chosen is up to the organization implementing single sourcing and structured content, but I think the question for most organizations will be not *if* they make profound changes to facilitate dynamic content, but *how* they go about doing it?

Implications for Writers and Writing

According to Albers, "single sourcing is a more complex way to write." Albers also believes that in single sourcing, "minor differences" (different sentence structures, different levels of detail, varying quality of information presentation, overlapping detail between modules, slightly different ways of formatting within the same style guide) "will become major hindrances to quality information presentation" (336). Others are skeptical that the fast updates and elimination of busy work promised by single sourcing gurus are consistently attainable. Robert Kramer (2003) cautions organizations that "single sourcing must be evaluated in the context of a documentation requirement, its scope and complexity," rather than implementing it merely for

the purpose of streamlining the workflow of the writer (333). Because of these and other similar issues, technical communicators and the organizations that employ them will have to be fully aware of the differences between traditional document production in the craftsman model and the practice of single sourcing.

Hackos and Rockley (*Technical Communication*) state that single sourcing results in lower costs and increased efficiency, therefore writers can "focus on the quality of the content rather than on trying to keep everything in sync manually" (Hackos 298). However, it must be stated that authoring content to be most effectively reused is an additional aspect of the job for technical communicators to think about, which may counter the simplification that Hackos and Rockley tout.

Clark agrees with Hackos that single sourcing allows the technical communicator to focus on the quality of the content and spend more time on writing, "because they no longer need to struggle with design, formatting and layout, (and) with maintaining multiple sets of files" (23).

Single sourcing and designing documents to be reused for different projects and formats has "broad implications for writers and writing that go far beyond software use, content management, or production initiatives involving quality, speed, or efficiency" (Carter 317). What is more important to this thesis is how specifically the technical communicators' role is affected, how the potential for chaos in the organization when writers resist the change to a single sourcing model is dealt with, how job responsibilities and job expectations are altered, and the overall effect of the implementation of single sourcing on writers in an organization and to

the field of technical communication (Carter 318). These are important issues that I plan to discuss in the following chapter as I aim to provide valuable insight on what single sourcing really means to a technical communicator and his or her role in the workplace.

CHAPTER THREE: SWEEPING CHANGE- THE IMPACT OF SINGLE SOURCING ON THE ROLE OF THE TECHNICAL COMMUNICATOR

The first two chapters of this thesis defined single sourcing in the context of technical communication, explained some of the different ways it is implemented in organizations, discussed the different levels and types of single sourcing, and compared the traditional processes of technical documentation to the craftsman model and to the more recent practice of creating single sourced, structured content. These issues are all important to the central topic of this thesis: how single sourcing methodologies specifically affect technical communicators. In this chapter, I plan to discuss how single sourcing affects the role of the technical communicator in the workplace, the impact single sourcing has on job qualifications for technical writing and related positions, how it affects the process of collaboration with co-workers and other writers, the impact on employer's and writer's job expectations, and summarize various suggestions for writers and managers on how to prepare for and implement single sourcing. Other various issues related to the impact of single sourcing on the role of the technical communicator will be covered towards the end of this chapter.

The majority of scholars that have researched single sourcing, if not all of them, agree that it has a profound impact on the technical communicator and how he or she performs his or her job. However, many scholars disagree on the nature of single sourcing's impact, whether it is positive or negative, and in particular, whether single sourcing simplifies or complicates the job of the technical communicator. In some cases it could be that neither is the case; it just

changes how technical communicators perform their jobs, or it may simplify some aspects of these job while increasing the scope of their duties in other areas. In this chapter, I hope to provide insight on the possible impact of a single sourcing implementation on technical communicators.

Positive Effects on the Role of the Technical Communicator

There are several immediate positive effects on the job of the technical communicator when producing technical documentation. The positive effects can immediately be observed in the primitive level 1 state of Rockley's model, where "single sourcing eliminates much of the drudgery work of technical writing, automating formatting, document design, page breaks, broken links, updating multiple document sets that contain very similar information, and other annoyances and difficulties that have plagued technical writers" (Clark 21). Most scholars agree that one of the main purposes and goals of single sourcing is to eliminate unnecessary of complications in technical writing. Some researchers believe that when these types of tasks are eliminated, it can greatly impact the amount of work a writer produces, even that they "can be 50 to 100 percent more productive when they are relieved of the responsibility of formatting" (Hackos 320). The increase in production certainly seems plausible, but mainly if the writer is eliminating tasks such as reformatting information for reuse in other formats, or creating another document from existing information via single sourcing, not when writers are tasked with other duties such as tagging content in XML or SGML, which makes it easier for the organization to

reuse the information later, but takes longer to write in the initial stages.

A positive viewpoint on the effect of single sourcing is that when content is standardized, and writers are constrained by how the document is structured, authors can then "focus on the content that belongs in the procedure, not on how to put the procedure together" (Rockley, *Technical Communication* 350). Information developers that rely on single sourcing "are able to focus their efforts on the quality of the content rather than on trying to keep everything in sync manually" when creating, updating, formatting, and reusing documents and information (Hackos 298). Hackos tells her employees that might feel threatened by the promise of cutting costs with greater efficiency in single sourcing that everyone has more than enough work already and that "saving time on repetitive and redundant tasks makes time for quality" (Hackos 335).

It makes sense that more time spent focusing on writing the content would result in higher quality, but to make this type of situation possible, the technical communicator would fill the role of writer only. Other employees would have to set up the content management system that controls how the content is structured. In some organizations, especially smaller ones, when single sourcing is implemented, the writer has the role of helping create and maintain the content management system, which could take up a lot of the time that researchers believe can be used to focus on the writing. The role of the writer really depends on the unique situation that they are involved in. Different organizations do things different ways; some technical communicators may fill multiple roles in single sourcing, or some writers may be able to focus solely on the writing and improve the content they produce. The latter situation is where single sourcing can

be a positive for the technical communicator if quality of the content that they write themselves is their main goal.

Single sourcing, as noted earlier in this thesis, also is helping to phase out workplace situations where one writer, working alone, writes a manual or publication that is not tested for usability or reviewed until near completion. In single sourcing, since multiple technical communicators often work on the same publication, it is reviewed by multiple employees, and the writers working on the project have the obligation to "produce testable intermediate outlines or models" throughout the development process (Weiss 6). Creating the document in this manner eliminates a lot of technical errors, cuts down on the amount of documents that are not submitted in time for thorough editing, and more importantly for the writer, it frees them from having to work with documents that are practically "unmaintainable by anyone other than the solo author" (Weiss 6). This changes the role of the technical communicator to more of a collaborator, someone who does not have to deal with a document that is difficult to reuse or reformat because they cannot consult the original writer on what they have written.

Other researchers, such as Kramer, note that because single sourcing "automates" things like page layout, typesetting, and text design, this simplifies the authoring process because the writer does not have to worry about "controlling intra- and supra-textual features, and thus, authoring is easier" (329). In his research, Clark explained that in the level 1 and basic level 2 single sourcing that he observed, technical writers "spent more time focusing on text composing than they had been able to previously" and "were able to focus far more on communicating with

their users than on managing the software underlying their real tasks" (23).

An aspect of some technical communicators' job is to participate in user discussion boards and answer user questions via email. Before single sourcing, the writer had to look up the facts and answers, copy the text, and post the answer in the existing thread on the message board or send it back to the user. With single sourcing, the writer often has "access to previously written chunks, not just entire chapters", which in turn "increases the speed with which these writers can get back to the user" (Price 200). This benefit with single sourcing does several things: it saves time spent looking up information and reformatting it to answer a specific user question, it is a faster and more effective way to communicate with the end user, and in effect, it alters the role of the technical communicator so they are "acting like clerks in a mail room, selecting this, that, and the other object to drop into the envelope and send off" (Price 201). The key point we can take from this is that it benefits both the writer and the end user in this situation.

Many researchers in technical communication, like Clark, frequently champion the cause of spending more time focusing on the user and how to communicate content better for them, so any added commitment from the technical communicator in this area must be considered a major positive. However, later in this chapter I will discuss the other side of this issue--how some aspects of the authoring process are now easier with single sourcing and there is seemingly more time available for these beneficial processes, while other unforeseen tasks can make the writer's job more complex and take away from time spent improving quality and usability.

Single sourcing can cause many role changes and strongly influence the division of labor within an organization. When single sourcing is implemented successfully in a manner that is a smooth transition for all parties involved, managers can see a result where technical communicators "turn their attention to interests rather than positions" (Bottitta et al 368). This result is an ideal outcome of single sourcing- when employees such as technical communicators forget about the title of their position or how their job has changed, and gravitate towards fulfilling a role that is not only much needed by their organization, but also something that they are good at and enjoy doing. In technical writing departments where workers fill different roles and collaborate to assemble documents into different formats for different audiences and purposes, single sourcing can be a very positive development for technical writers (Ament). By eliminating the duplication of effort, and removing the drudgery work of technical writing, Ament describes a positive outcome of single sourcing implementation:

> Document assembly enables writers to do what they do best. Writers who care most about information development can focus on document content without wrestling with publishing technologies. And writers who care most about information architecture can configure document development tools to generate new documents in different formats quickly and easily (Ament 7).

Ideally, technical communicators should realize that their role in single sourcing is to develop parts of the whole, rather than a whole product itself, and because of this process, "team members become more interdependent" (Ament 16). Of course there are other factors to

consider, but a situation where technical communicators have the opportunity to work in the area that they are most interested in is something that communicators would likely embrace. The amount of freedom and flexibility an organization offers their employees during the implementation of single sourcing greatly impacts whether this type of situation is plausible. "Single sourcing is local, not global," in other words every situation is different (Ament). Single sourcing can also cause some technical communication departments to conduct a comprehensive study of their practices, which can lead to very positive implications for everyone (Clark 21).

What we often read or hear about the move towards single sourcing, content management, and structured content is regarding the benefit to the business. Single sourcing and related methodologies can save time and money, increase efficiency and productivity, facilitate the creation of documents and texts in formats that were not previously possible, and increase the quality of the content for both the creators and users of products. Some might say that "can" is the key word in the last sentence. Single sourcing "can" do a lot of other things, depending on the organization that implements it, and how it is implemented.

Single sourcing can also affect the status of technical communicators in the workplace and in their profession, how much money they earn, how they are perceived by management, what companies expect from them, and their overall marketability.

Impact on the Status of Technical Communicators

The further emergence of single sourcing methodologies can have a very strong impact

on the status of technical communicators. Some researchers believe that it can be very beneficial to writers. Hart-Davidson explains that single sourcing has this potential because, more and more, "content developed on the Web becomes the product, and pages of information comprise the interface" (Hart-Davidson 145). Information is a rising commodity in today's business world, and we see for ourselves every day how much the World Wide Web continues to expand. It makes sense that the status of technical communicators has the *potential* to elevate, because there is a growing need for professionals that can communicate the increasing amount of information available to a variety of different users in the multiple formats required.

Other researchers have noted that, with the emergence of knowledge management, a related issue to content management and single sourcing, technical communicators now have the opportunity to seize leadership positions in "a vital area of nearly every business in the burgeoning knowledge age" (Wick 517). This aspect of knowledge management is related to single sourcing because one of the reasons businesses implement single sourcing and a content management system is to protect the organization from losing important information, knowledge, and best practices, which can be saved and stored in a single sourced database or repository. Should technical communicators choose to participate or apply for leadership positions in content management initiatives implemented by their firms, "single sourcing has the potential to increase the organizational impact and prestige of technical communicators…" (Clark 21). Technical communicators are skilled in more than just writing and analyzing information, and it is beneficial to the overall perception of our profession when they obtain leadership positions in

an organization or company-wide initiative to manage content and information.

The effect of single sourcing on the status of technical communicators is important because their skills and expertise are often overlooked and undervalued. Technical communicators are skilled at "managing the massive amounts of unstructured data that currently makes up the World Wide Web or balancing the need to provide relevant, customized, even personalized information to an audience that is increasingly diverse" (Hart-Davidson 146). The audience is not just increasingly diverse in demographic makeup, but also in the format and interface they use to access information. Single sourcing methodologies are intended to provide customized information to end users, but to be delivered via a generalized, reusable process. Hart-Davidson believes that "technical communicators are most appropriately charged with maintaining a balance" between these aspects of production (151).

The other side of the issue is that in some situations, single sourcing and "the separation of content from form can in fact add to the limited perception of expertise many in organizations have about technical communicators" (Clark 23). After observing employees at SecureCom Corporation, Clark noticed that technical writers "were boundary workers because of the conceptual separation of their work from that of others in the workplace" (23). While taking content produced by technical employees such as engineers and making it easily understood by the end users is part of what many technical writers do, when that is *all* that co-workers think they do or are capable of doing, it can result in technical writers being "granted less symbolic, social, and material capital than other workers in their organization" (Clark 23). The bottom line

is that single sourcing implementations that limit technical communicators' tasks to only writing and editing, and no design work or content creation, may cause communicators to be perceived by organizations as expendable or of lesser value than other employees. Some companies have begun separating technical communicators who do design work (into higher-paid positions) from those that only write and edit (Carliner 163).

The separation of skills and tasks, and the placing of employees on different career tracks goes back to an earlier statement in this chapter: that the circumstances of the single sourcing implementation, the particular methodology used and the system put in place, greatly determines how the technical communicator is affected. If single sourcing is implemented and technical communicators continue to use a wide variety of skills as part of a team working together, or if they are allowed to choose or progress into an area of the job that they enjoy working in, the implementation can go very smoothly and be very beneficial for the technical communicator. However, when the implementation of single sourcing confines the position and everyday tasks of the technical communicator to one small area, such as writing content only, this can end up limiting everything from their salary to how they are perceived by others in the organization.

The technical communicator must be aware of what is happening around him or her and observe whether the type of single sourcing implementation is a positive one for his or her status. A major reason why awareness is important is because of the specific role changes that may occur:

Single sourcing can, if practiced according to our scholarship, create strong distinctions

> between categories of work- 'tool experts' vs. 'writers' vs. 'designers' – distinctions that leave designated 'writers' able, at times of performance evaluations, to claim little of the broad-ranging, interdisciplinary expertise that has long been the strength of technical communicators (Clark 23).

It seems logical and smart for technical communicators to evaluate their own unique situation and how their status is affected by new single sourcing methodologies, in order to know where they stand in the changing landscape of their job.

Effects of Single Sourcing on Authorship and Creative Control

When content is structured, standardized, and shared across many levels in an organization, it is almost impossible for a single author to maintain creative control over what they write. This is especially true in many single sourcing environments because a single writer no longer creates content on their own, but rather as one member of a team creating documents together. Rather than writing a whole document, and "owning" the content for a whole document, in single sourcing a technical communicator "may be responsible for a piece or cross-section in a series of documents" (Rockley *Technical Communication* 352).

Since single sourcing is a collaborative environment, where writers often create chunks of information for databases, technical communicators may have to accept that they are losing authorship and "a proprietary relationship to their work" (Williams 325). This can be described as a "challenge to their professionalism" and technical communicators may need to "accept this

further degree of ‘egolessness’ or watch as their work is exported to countries where workers are more willing” (Williams 325). This situation can be very unsettling to technical communicators, especially those that have been working in the craftsman model and creating content effectively on their own for many years and also fear the outsourcing of technical writing jobs to India and other nations outside the U.S. However, since many organizations are committed to moving to structured content and single sourcing as a beneficial way to do business, it makes sense that technical communicators will have to accept this new way of doing things or face the outsourcing of their jobs.

A lot of the move to single sourcing is a new mind-set or way of thinking that may or may not be communicated from management in the organization. Simply put, in single sourcing environments technical communicators must realize that they are part of a team now and that the days of claiming authorship over an entire document are, in many cases, over. Managers of technical communication departments “must be prepared to train writers, not on the software, but on a new way of thinking” before they introduce a new system (Sukach, Kennedy, and Devine 451). If technical communicators understand the team concept and different way of thinking that is required for successful single sourcing, then the transition will be much easier for all involved.

Other Changes to the Job of Technical Communicators Caused by Single Souring

One of the potential results of writers’ losing authorship and creative control over the products and documents they produce is that technical communicators may fill the role of

content developers instead of writers (Carter 317). This can be a profound change, especially to the people in an organization whose primary responsibility prior to the implementation of single sourcing was writing. According to Carter, "one possible consequence of single sourcing is that the unified writer will be no more. The build-up of skills that writers possess may have come to a head; writing may be decoupled from information design, from layout, from grammar" (319). To explain this point more clearly, technical communicators who once developed whole documents including the writing, design, layout, usability testing, and editing may now only be responsible for only one aspect of the process. They may not do any writing at all, or they may only write in tagged chunks of information to be put into a database for other technical communicators to pull from. Why would a writer stop "being a writer" in a sense that they no longer produce text? Because producing documents in single sourcing environment requires it (Albers 340). There is often a drastic shifting of roles in the department or workplace:

> Roles may converge: writers who once focused exclusively on print documents or online help might find themselves responsible for writing topics for both print and online documents. Alternatively, roles may become more specialized; for example, writers might concentrate only on writing while production specialists concentrate on producing final materials (Bottitta et al 358).

Technical communicators may be forced to accept these role changes and the potential reality that the landscape of the profession is moving towards a model where producing technical

documentation involves multiple employees responsible for smaller, more defined roles in the overall production process.

In some situations technical communicators may fill multiple roles, but the theme is that technical communicators may have prepare themselves for an environment where they go from being involved in several or all aspects of production to focusing on one thing. Of course, focusing on one thing could negatively impact the amount of expertise and responsibility they can claim to management in performance reviews or to potential employers in a job search, another part of the changing landscape of technical communication that single sourcing and structured content is affecting.

Increased Job Complexity as a Result of Single Sourcing?

Whether single sourcing makes the job easier for technical communicators or if it significantly increases job complexity is somewhat of an issue. A lot of the positive talk from researchers on this topic discusses the benefits to the business such as increased efficiency and quality of the documentation through decreased errors, standardization, and increased access to information. It has been estimated that when writers are relieved of the responsibility of formatting, that they "can be 50 to 100 percent more productive" (Bartlett 2002, qtd. in Hackos 320). Some of these researchers even go as far as to say that single sourcing makes things easier for the writer, because they can focus solely on the content or on one of the specific aspects of production that they choose or are assigned.

After the implementation of single sourcing, “the removal of design and format control is often considered a simplification of the process. The writer, in effect, no longer has to worry about making such decisions, or controlling intra- and supra-textual features, and thus, authoring is easier” (Kramer 329). While Kramer disagrees with this notion of simplification, his statement is a good explanation of the positive mindset that considers the implementation of single sourcing a simplification of a technical communicator’s job.

What Kramer and several other single sourcing researchers (Albers, Clark) believe happens to the technical communicator as a result of single sourcing, especially in advanced single sourcing and advanced content management, is increased job complexity and responsibility. With this increased job complexity and new responsibilities, “it is common for very little original writing to occur” (Kramer 329). Instead, “writers in effect become managers of the tools they use to create, publish, and manage content, and of multiple sources and shared files” (Kramer 329).

Technical communicators may have to learn skills of a more computer science-oriented nature (such as software skills and hypertext knowledge), which could impact their role and the overall complexion of their job. These technical skills have the potential to “jettison traditional technique that is the heart and sole of most technical writing theory” (Kramer 328). Many of the new skills required “also increase complexity in other ways that writer’s aren’t traditionally prepared for” (Kramer 329). An example of a new skill implementation would be the advanced single sourcing and content management implementation that took place at IBM a few years ago.

Writers there had to learn the "architecture required to support dozens of languages, the support of up to 7 machine platforms, and the requirement to produce HTML, PDF, Winhelp, and additional specialized media types from single master files" (Kramer 331). The requirement to learn these types of skills and take on said extra responsibilities can be very overwhelming for a technical communicator, especially one who comes from an educational background not in the computer science field, such as English or Communications.

To demonstrate how much more technology expertise is required for writers to do his or her job in a single sourcing environment, the following list is a "typical set of responsibilities for a writer during a development cycle":

- Check in files weekly to maintain current file base
- Ensure that books "run" error-free
- Report file errors to owners of file. Run both PDF and HTML versions of all books owned
- Verify conditional statements information for each platform that affects document
- Update indexing
- Prepare book for review in HTML and PDF formats
- Update new cross-references or related files

(Kramer 333)

This list exemplifies the "technologist nature" of many of the new responsibilities with single sourcing and also explains how several researchers (Rockley, Kramer, Clark) believe that single sourcing increases the scope of what writers do.

Large companies that implement single sourcing will often see a streamlining and higher efficiency in the creation of documents in multiple formats by using DTD (Document Type Definitions) and structured content, “but only at the cost of increased job complexity for the writer, who now becomes a file-management technologist and troubleshooter extraordinaire” (Kramer 331). Some other complex features a writer may work with in single sourcing are “conditional expressions”, text structures that contain multiple markups in short phrases or word blocks, applicable to several different formats (Kramer 331). These features and innovations are necessary for organizations that seek to produce documents in multiple output platforms and the wide dissemination of standardized information. While they “solve specific market issues,” they come with “internal technical challenges” that often vastly increase the job complexity for writers and technical communicators (Kramer 333).

Some Negative Effects of Single Sourcing on the Technical Communicator and Suggestions for the Broadening of Skills

There are many varying opinions on what type of effect single sourcing has on the technical communicator, positive or negative, empowering or limiting. Most or all agree that the implementation of single sourcing methodologies has a drastic effect on the role of the technical communicator, and greatly changes the nature of the job.

There are many possibilities and instances of negative results for the technical communicator after single sourcing is implemented. Of course, as stated before, every situation

is different. In some cases, single sourcing has the potential to improve the status of the technical communicator and greatly benefit the organization that employs them. However, no matter what the specific effect is, everyone in the field should be aware of what can happen when single sourcing methodologies are limiting to the technical communicator. It does not appear that the researchers who point out the negative possibilities are trying to scare technical communicators, or that they are against these methodologies, but rather they are trying to educate members of the profession so they can be prepared for or adjust more smoothly to changes in their job and organization.

As discussed in the previous section, "single-source production can be complex, messy, frustrating, and time-consuming" (Kramer 328). But the implications have the potential to be much more serious for technical communicators. With the increase in the amount of structured content, which results in the decrease of actual writing, or reduces writing to the creation of chopped sentences and brief phrases tagged in XML code, writers are in danger of losing content production altogether. When technical communicators limit their roles to content production and do not take advantage of opportunities to broaden their knowledge and base of skills, it is possible that technical writers could become expendable in some single sourcing environments. Because of potential down-sizing, technical writers should "consider what might be lost if we limit our roles to content production" (Clark 24). Technical communicators have always prided themselves in having a broad range of skills and being in an environment where content production is all they are responsible for could be a negative implication for their career

progression. "The application of structured documentation requires technical communicators to expand their skills and knowledge areas to better provide users with documentation to their individual needs and desires" (Sapienza 407), so not only is expanding their skills and knowledge because of single sourcing good for a writer's career path, but is also a positive for the end users of the products we create.

By adding new skills and increasing their knowledge base, there is "the possibility that single sourcing creates a new kind of writer, one who is more integrated than before…by 'integrated' we mean that the writer is required to integrate more skills to retain the self image (and the job description) of writer" (Carter 319). If single sourcing were to help produce a technical communicator who had wider base of skills than before, then that would definitely be positive for all involved. Single sourcing and content management could also become an additional skill in the repertory of a technical communicator (Williams 326). The adding of new skills and competencies in technology may also have implications for related positions in technical communication such as information designers "as businesses attempt to better target their products, and as businesses address ongoing pressure to keep costs competitive, all types of technical communicators should work to develop proficiency in the technology they are communicating" (Carliner 160).

Some of the skills that technical communicators will have to integrate most during and after the implementation of single sourcing methodologies are skills in collaborating with co-workers. Because single sourcing involves creating a "collaborative authoring environment"

(Rockley 352, Hackos, Williams), technical communicators will have to work together for a variety of reasons. One of those reasons that "text creation and updates" will start to move to smaller chunks of information created by multiple authors (Albers 342), is because creating a single source manual or building a single source library requires "a high degree of cooperation from participating groups" (Bist 87). Also, the fact that content and format are often separated in the documentation process necessitates collaboration between co-workers and promotes team members become interdependent on each other (Ament 10).

Strategies for Managers Dealing with Changing Roles of Technical Communicators

The implementation of single sourcing methodologies in an organization can have a very drastic effect on the technical communicator and his or her role. There is often a shifting around of positions, changing of roles, and even the adding and elimination of roles. These changes in the workforce can be very stressful to employees of an organization, and management must be able to help make the transition to single sourcing a smooth one along with facilitating the shifting of roles.

After making the move to single sourcing, an organization may decide they need a media expert to analyze the strengths of formats and maximize their effectiveness (Bottitta et al 358). Another position that may be added is a usability expert. At the same time, some roles may be eliminated because now multiple writers are not needed to write online help and printed material; one writer can do both. However, it is more common for an organization to eliminate roles but

also allow employees whose role is eliminated to transition into another position (Bottitta et al 358).

Another stressful aspect of a change to single sourcing is the added pressure that comes from the higher-ups in the organization. In some cases, the technical communication department convinces upper management to implement single sourcing as a financial benefit to the business. In return, the company often has higher expectations for the department, sometimes including increased productivity with decreased budgets, where "the combination of fixed resources, complex projects, and higher expectations can strain even the most functional, productive team" (Bottitta et al 359). This is yet another reason why technical communication managers will have to successfully deal with role changes of their employees--to ensure that goals are achieved.

However, the main issue for managers is using the right strategies for implementation and navigating the changing of roles for technical communicators in their department or organization. Because the change to single sourcing is such a drastic and sweeping change from how things have been done traditionally in the profession, there can be a lot of resistance and instances of employees not "buying in" to the change. When authors are forced to write structured content and lose a lot in the creative aspect of their job (Rockley *Technical Communication* 351), or when their authorship and propriety is taken away, technical communicators may feel like they are being sold short, phased out, or even disenfranchised. Writers have been able to adjust to change in the past, as technical communication is an ever-evolving profession. However, "adapting to incremental change is considerably easier than

adapting to sweeping change", although technical writers should continue to adapt (Carter 318). Managers must be able to help their employees adapt and adjust to the type of sweeping change that single sourcing involves.

One of the ways managers can deal with role changes are to perform a comprehensive analysis of the department and of the technical communicators employed there, in order to determine which communicators are suited for certain positions. Research has shown that technical communicators who adapt quickly to single sourcing "typically share the following traits":

- Expert product knowledge
- Strong multitasking ability
- Strong interpersonal skills and team awareness
- Strong problem-solving skills that are grounded in an understanding of the toolset
- An understanding of document types and the way they are generated
- Willingness to relinquish design control to a DTD and focus on the content and file management as explicit job duties
- Strong ability to work and learn independently
- Strong ability to work in a non-linear mode

(Kramer 333-334)

In the new environment of single sourcing and structured content, "the most effective writers are those that accept change as the one constant and can visualize where and when bits of

information exist in a networked system of files" (Kramer 334).

Other suggestions for managers to successfully navigate a single sourcing implementation are to enforce a strict structure and set of rules for what is allowed to go into a content unit (Taylor and Petelin 6), to give authors some flexibility to change their style sheets and develop materials to meet customer needs (Rockley *Technical Communication* 351), put a "change management plan" in place (Rockley *Technical Communication* 353), and finally, to "let team members do what they do best. Centralize information architecture, decentralize information development, and encourage over-communication" (Ament 21).

When allocating specific role changes, Albers recommends that technical communicators be split into two specialized groups based on experience: the senior people analyze and identify the requirements for information while the junior workers do the writing and learn to move into the analysis jobs (Albers 339). The reasoning for this recommendation is that single sourcing "supports and perhaps demands a more clearly defined distinction between junior and senior levels" (Albers 339). While this idea is certainly interesting and should be considered, the main thing that managers helping to implement single sourcing need to remember is that they should come up with a detailed plan for action, carefully delegate responsibility in the areas where their employees can best succeed, and then do whatever they can to help them adjust to the drastic change. Managers may need to do a lot of "coaching up" and use persuasive methods to get everyone to "buy in" to the move to single sourcing and structured content, but focusing on the technical communicators in the organization whose role is altered is definitely a necessity in this

venture. They must also be prepared for resistance and opposition from some employees, and know what to say and do when they encounter this. If a technical documentation manager is well-versed in the technology and organization changes that come with single sourcing, and has the skills to manage groups of people and help them achieve their goals, then single sourcing should be something they can implement and practice with success.

While the specific technology is single sourcing, "the broader issue involves how we integrate any technology into the field, how the integration redefines our processes and products and how we perceive our own individual and organizational relationships in light of technological change" (Carter 320). This is very enlightened and thought-provoking statement. Single sourcing is a complex invention, and a technology that has wide-ranging effects on everyone from management to information architects and developers to an entry level technical writer. We must have a full grasp of the technology, methods, and techniques that change the profession, and how each aspect affects us, good or bad. Probably the most emerging and important technology that is affecting the World Wide Web, computers in general, and for our purposes, single sourcing and content management, is XML (Extensive Markup Language). XML is becoming more widely used in technology even as you read this and is a key technology for the move to single sourcing because it facilitates its creation, implementation, and success. Like single sourcing methodologies in general, XML can also drastically alter roles in an organization and the way communication products are produced and managed.

In the next chapter, I will discuss the implications and effects of XML on the field of

technical communication, on writers, on managers, and on other related workers.

CHAPTER FOUR: XML-BASED SINGLE SOURCING AND THE TECHNICAL COMMUNICATOR

A major part of the single sourcing movement in technical communication is XML (Extensible Markup Language). XML is seen as the next step in the evolution of the World Wide Web:

> If the invention of the Internet was the first phase, and the invention of the Web was the second, then, as Bill Gates put it, 'XML is the third phase of the Internet' (McGovern & Norton 67).

HTML was created for the presentation of text-based content on the Web. Now XML is the standard for the "structuring" of content on the web and is becoming the standard markup language for single sourcing (McGovern & Norton 67).

In this chapter, I plan to discuss XML and the theories that have made it an integral part of single sourcing systems, but not the full extent of issues surrounding XML. Instead, I will focus on how XML affects the technical communicator and the field of technical communication. My goal is to produce findings and conclusions that put XML and the job of the technical communicator in related context, and make a statement that is helpful to both students and professionals in the field.

Brief Background on XML

XML was first introduced in 1996 and "had a shaky start," but was later reformulated in

1998 by the World Wide Web Consortium (W3C) with much success, drawing enthusiasm and widespread adoption by database, server, and computer software companies (Battalio 212). XML grew out of Standard Generalized Markup Language (SGML), which had early origins at IBM in the 1980s as a new way to describe document content so it could be published in multiple ways (Dick 15). However, SGML is very complicated and has shown to be difficult to grasp for many workers. After XML was reformulated, the W3C released the XML 1.0 Specification as a "recommendation", their highest level of endorsement (Dick 16). Now XML is a more widely-used markup language for the reuse of information than SGML.

XML code contains more context and more descriptive information than HTML. It contains metadata ("a formal way to describe what a piece of information means") or information about information (Dick 13). The metadata in XML documents follow rules that are formally described as "shared context." The shared context applies to a particular type of document and serves as a contact between the document sender and receiver. The document sender agrees that the document conforms to the shared context and vice versa. According to the shared context, the document receiver agrees to interpret the document (Dick 13-14). This is how XML documents and information are shared between computers and users.

A Document Type Definition (DTD) is defined as: "a collection of XML markup declarations that, as a collection, defines the legal structure, elements, and attributes that are available for use in a document that complies to the DTD" (World Wide Web Consortium definition of a Document Type Definition, http://www.w3.org/TR/xhtml1/#dtds). DTDs are the

building blocks of an XML document and are necessary for the sharing of data and information with others and groups of people. Programmers can use a DTD to verify their own information or a DTD to verify that data they have received from others is legitimate and correct. The elements, tags, attributes, metadata, and DTDs in an XML document allow for it to be more well-defined than a document created in HTML. It also allows for the easier sharing of information and for the ability to single source and use the information in a wide variety of formats.

When XML-based single sourcing is implemented in a technical communication group, there are two main approaches. The technical communicator's or author's text can be converted to XML code, or the authors can create content inside "an XML authoring environment" (Boiko 758). The first option has been the most widely used by organizations so far. Organizations choosing this option use style sheets, templates, macros in Microsoft Word to get as much of the DTD structure into the authoring environment, in effect simulating XML in an unstructured environment (Boiko 758). The second option, which is being used more now and becoming more popular today, is to use an XML authoring tool such as Blast Radius XMetaL, Arbortext Epic, RenderX, or DocSoft W2XML. These XML authoring tools and XML editors are widely used and there are countless others already out on the market with more to be released in the near future. Some of these XML authoring tools, such as XMetaL, are not as user friendly as Microsoft Word, but there are rapidly improving and already becoming "workable for non-technical end users" and for technical communicators who are not yet proficient with XML code

(Boiko 758).

Tim Berners-Lee, inventor of the World Wide Web and Director of the W3C, describes XML as "both a boon and a threat to the Web dream" (Berners-Lee 160). There are many positives to XML. For example, it helps decrease the amount of information lost that can be reused. Also, anyone can create their own "tags" in XML to fit their intended purpose. Plus, the tags in XML are "semantic tags (tags that have meaning), rather than generic tags (as in HTML). One applies tags that describe the content of the information, not the formatting" (Rockley, *Content and Complexity* 332). XML documents are also more well-defined than HTML documents, allowing people to create spreadsheets, address books, charts, and presentations quicker and easier, without having to worry about information being lost in the translation to HTML (Berners-Lee 161).

The "threat" that Berners-Lee describes is that, although anyone can create their own tags, they cannot incorporate them with someone else's tags, which is different from HTML, where all standard tags are compatible. Berners-Lee fears that XML could lead us back to the time of many incompatible computer languages (Berners-Lee 162). So far, that fear has not been realized and the use of XML is thriving in multiple industries. Boiko (2002) states that: "XML may be one of the first standard markup languages that actually gets accepted as a standard" (Boiko 743).

XML, more so than HTML, causes technical communicators and other professionals that use it to think more critically about the connections between information and how pieces of

content are related. It also demands that they "think about the very nature of data- how data is often embedded with other data- and it demonstrates the weaknesses of other technologies that would not allow them to do so with such ease" (Applen 310). Any new thoughts or ways of thinking that result from using XML can only be a positive and lead to the more effective delivery of content to end users.

XML for Technical Communicators

Organizations are turning to XML for single sourcing initiatives because they want to identify even the tiniest amount of content by its structural role or meaning. Converting a company's "legacy documents" into XML makes them easier to re-use for different purposes and display formats, customizing the information for how the user is going to work with it (Price 200). XML documents are extremely useful to technical communicators and others for creating content on the web, such as online help.

While XML can make things easier for the user, the primary motive for organizations that employ technical communicators moving to single sourcing via XML is to allow them to easily identify, store, and retrieve chunks of information during the documentation process (Williams 322). Using XML for single sourcing allows organizations to more efficiently share information between departments and with other organizations.

Some professionals and scholars have defined the emergence of XML as a response to provide "content in a way that is accessible to information processing systems in a standard way"

(Anklam 38). Technical communicators are now needed more and more in the workplace to be able to categorize, organize, and make relevant information for the end user, something that has long been one of their strengths. XML is another format and technology for producing content where technical communicators can use their skills. Many of these same scholars that have written about XML urge technical communicators to become proficient at XML, some because it is an ideal progression for technical communicators and because technical communicators "get it about tagging things" (Anklam 43), and others because it is an area where technical communicators can benefit the field and organizations where they work (Williams 324). When technical communicators help make the knowledge within their documentation more searchable and accessible, they create knowledge for their organization and also add value to their enterprise (Hughes 283).

Moving to XML or having to now work with XML will require many technical communicators to acquire new technical skills. However, many of those skills will be best acquired "within the context of specific job assignments as industries develop sets of XML tags unique to their needs" (Carliner 165). Many technical communicators already are proficient in or at least comfortable with HTML code and these communicators should be able to learn XML quickly and with relative ease.

Because of the changing landscape of how people receive their media today, and the shift from previously only reading text on paper or online to now accessing information from PDA's, television-to-internet devices, text-to-voice machines, cellular phones, MP3 players, and other

types of technology, technical communicators are now expected to produce content for these multiple mediums. XML is emerging as a way to produce that content for various mediums and in alternate ways that are not accessible via HTML and other computer languages. XML is effective for this because "documents created in XML can be simultaneously exported for display on wireless devices and Web browsers using style sheets that transform the (XML) modules. More significantly, quality control is ensured because the modules are stored once in a central repository and then reused or single sourced" (Sapienza 401). Data that is tagged and coded in XML can also be copied from one or more databases and entered into another database without the requirement for additional data to accompany it (Simon 2001 p.53 qtd in Applen).

The style sheets used in XML are different from a traditional style sheet that manages the look of a document. XSL (eXtensible Stylesheet Language) is a part of the XML standards family, defines the formatting of documents, and is used to reformat XML documents to other formats (Rockley *Content & Complexity* 332). XSL is very valuable for single sourcing, because it can be used to manipulate information, generate new information such as a table of contents, and you can create a different style sheet for each output format, run an XML file through it, and automatically generate content for different outputs and formats (Rockley *Content & Complexity* 332). This is another way that single sourcing is facilitated and supported via XML and its various tools and standards.

Another advantage of XML is that it "compels (technical communicators) to reexamine just what information is of value to their organizations. It also makes it easier to search within

different databases for specific information that they might need as opposed to information that is encoded in HTML or embedded in a traditional database" (Applen 308). When information is broken down into chunks that are later reassembled into documents, each chunk of information must be recognized as a value in itself, an important piece of knowledge possessed by the organization.

Usability in XML-based Single Sourcing

Although single sourcing in all its forms, XML-based or not, is generally designed to help organizations produce documents more easily, more efficiently, and in multiple formats, usability should still be a major goal. If an organization is single sourcing and churning out multiple documents in multiple platforms at a higher rate, then that may be good for the company, but not necessarily a positive for the individual that uses the product. The products still have to be highly usable to be effective and meet the needs of the end user.

As discussed in a previous chapter, in single sourcing, usability tests are generally performed throughout the document or product development process. An intriguing aspect of XML-based single sourcing is that if a usability test has already been completed on a certain product and it is being updated or reformatted for single sourcing and other output formats, "a technical communicator can create (XML) tags that represent usability metrics from an actual user test and produce a document from them" (Sapienza 403). This is a way for documents to be created via XML-based single sourcing that are both usable and possibly easier to create as well.

XML can also be programmed to respond to user habits and responses, allowing software and product testers to directly shape the user interface and content (Sapienza 403). The integration of XML can be seen on several music and sports websites (among other sites on the internet) where an internet user can select which song to play on an XML-created media player, or which video highlight, statistic, or instantly-updating box score comes up based on what they select on the interface.

Changing of Roles for Technical Communicators using XML

Similar to the implementation of single sourcing, the use of XML for single sourcing also has a significant impact on the role of the technical communicator. The possibility remains that when technical communicators are involved with single sourcing databases and repositories via XML, their role will change from being "mere writers of documents to architects of information structures" (Battalio 212).

However, on the other hand, some technical communicators may work for a company that has other, more technical employees doing the coding in XML and creating the structure for the content. In this situation, "the role of the technical communicator is limited to initial consulting, and then content production is reduced to a data-entry task" (Clark 24). In fact, this is the case in more companies than not, that the technical writers are not given the opportunity or responsibility to create modular content in XML, but rather the modules and structure is set up for them, and they just input the information that is structured and reused across different

medium by a coworker such as an information architect.

Technical communicators whose role is changed upon the implementation of XML may serve as "metators." In this role, the metator applies the metatorial framework (framework of the metadata) created by a content analyst. A metator is similar to an editor, reviewing an author's work for style, usage, grammar, and clarity, but they focus on the metadata only. Technical communicators are seen as ideal for the position of metator because they have experience as a technical writer "who has had to focus on highly structured material" such as the metadata in single-sourced XML code (Boiko 758).

Several scholars in technical communication (Applen, Battalio, Sapienza) have suggested that technical communicators should learn XML so they can take advantage of opportunities in the design of single sourcing systems, have more control over the information delivery to the user, and also to seize leadership and management positions in organizations that are now entrenched in using XML and single sourcing.

Often the reason that technical communicators are not considered, trusted, or given the responsibility of helping design and create single sourcing systems (that often use XML) is because it is seen as outside the scope of what a technical communicator does. However, the processes of "system thinking; finding and articulating patterns, structures, and relationships across specific problems, project, and task domains; moving from tactical to strategic thinking that can impact large social structures such as the enterprise, the market, the community, the state" *is* in fact within the realm of a technical communicator's scope and capability (Hart-

Davidson 151). Technical communicators are also ideal for working with XML-based single sourcing systems because they understand the value of a piece of information or a document, which "comes with experience and judgment" from being "familiar with the people, processes, and products of an organization. In systems companies, this knowledge is often centered in the technical communications group" (Anklam 42). In order to communicate this to management in our field, it is necessary to be more outspoken about being involved in system thinking and the creation, design and management of cross-organizational databases. Having a knowledge and proficiency in XML could go a long way in validating the argument that technical communicators should be more involved in these processes.

Of course there is also the larger issue of how organizations' moving to XML affects the job of the technical communicator and his or her status in the workplace. The use of XML and creating documents via structured content is decreasing the amount of control the technical communicator has on the layout and appearance of their work. This reduction in control has been described as the "sudden abrupt change in the power of the technical communicator from perfect control over every element of the page to provide of 'tagged input'" where the output is controlled by Document Type Definitions (DTD) in unseen computers (Weiss 8). While I do not believe that a technical communicators across the board will be turned into a glorified data entry operators who only "fill in the blanks on preprogrammed interfaces created by front end developers," the mere possibility of the prestige and salary of technical communicators dropping because of a new document development model with XML is something that all technical

communicators should be concerned about and aware of (Battalio 241). Technical communicators must keep their eyes open and take notice when they are being slowly moved out of jobs that are software intensive or when their position is changed to one that is lacking any type of managerial control over their work or in their workplace environment in general. The best way to combat this negative outcome appears to be emphasizing the wide range of individual and collaborative skills that technical communicators possess, keeping abreast of the new technology and tools, and having a high awareness of the changing roles within organizations.

XML, like single sourcing and any type of structured content in technical communication, may also increase the threat of proprietary loss for authors, possibly destroying "any last vestige of ego involvement by the author" and causing "the relationship between the publication and the technical communicator (to) resemble the relationship between a gold wedding ring and the gold miner" (Weiss 8). In my opinion, this prognosis is a little extreme, but it is a concern that, because of XML and single sourcing, the final product or the document delivered to the end user may not contain very much of content written or created by the technical communicator. Writers may have to accept the outcome of producing less text on their own with XML, and contributing more in small chunks of tagged information that are entered into a database.

XML and Knowledge Management

The field of Knowledge Management, "The way a company stores, organizes and accesses internal and external information" is a related field to single sourcing and content management, and can be described as being the broader, more wide-ranging process that organizations and large companies carry out to manage their information and various best practices (Massachusetts Institute of Technology definition of Knowledge Management, http://ccs.mit.edu/21c/iokey.html). Many organizations are spending increasing amounts of money on knowledge management and several scholars such as Anklam (1999), Applen (2002), and Wick (2000) have encouraged technical communicators to become more involved in knowledge management. XML is a way that this can be achieved.

To move into leadership or management positions in knowledge management, "developing a stronger understanding of the technology serving knowledge management", such as XML, is essential (Wick 524). Also, when technical communicators learn "how to model knowledge using XML", they provide "data with context, thus supporting knowledge management" (Applen 307-308).

In some organizations, databases are created in XML by workers with a computer science and technical background, but the information is not presented in the most effective manner because they don't have the audience-oriented and/or writing experience that a technical communicator has. In this case, if a technical communicator is proficient in XML, he or she can

"work with others in their organization to rewrite the XML code" (Applen 310). This scenario would be a win-win situation, because the organization would benefit by possessing higher quality information and the technical communicator may also be able to perform his or her job of writing and reusing information easier because it is more rhetorically effective, organized, and clear.

Problems and Potential Problems with XML-based Single Sourcing

While XML has been lauded by so many people in the field of technical communication, some note the problems that may occur for single sourcing using XML. Michael Albers notes that while XML would be his current choice to develop a single-source system, he would "expect a host of unforeseen problems to crop up around controlling and scaling up content design and development" (Albers 337). XML has proven to be a successful way of implementing single sourcing, but the success stories "are often based on creating static documents with multiple outputs, not for information that gets dynamically changed on the fly" (Albers 337). It may end up that just as single sourcing is only an ideal solution for certain organizations, XML may only be ideal for certain types of single sourcing implementation.

There is no doubt that new requirements for technical communicators to produce documents using XML-based single sourcing make the job more complex. However, we must not lose sight of the fact that our true challenge is the solving of communication problems (Carliner 165). If technical communicators focus the majority of their attention and time to tools

such as XML and basic editorial skills, companies will only hire them for editorial and production work, and ignore their desire for design work, which, according to Carliner, is what "many technical communicators seek" (165).

Another potential problem with XML is the increased complexity that it brings to organizations that are using it. As mentioned in the section on XML and knowledge management, some technical communicators could be working as knowledge managers and dealing with a lot of XML code and databases created by XML. Communicators in this situation must be aware that "the strength of XML as a tool can also be its weakness. Although XML allows them the ability to more ably store and transfer information, if they do not implement an integrated design method in the early stages of the development phase, they run the risk of creating a system that is too complex and trouble ridden to use effectively" (Applen 310). Sapienza states that Document Type Definitions (DTD) "constrains the XML document" because when one is evaluating the usability of an XML structured document, one cannot just test the usability of the document or product itself- one has to start by evaluating the DTD and work his or her way up from there (Sapienza 403). This method can be a potential problem because it would make testing for usability more time consuming and more difficult, thus adding to the job complexity that technical communicators often inherit with single sourcing and XML.

In a situation where the writer is tagging the text with metadata, it is advisable that this is done while the text is being written because "there is too much contextual knowledge in the writer's head that will have long since been lost if a two pass system of write text and then tag"

is used (McGovern 2003a qtd in Albers 168). Even when a subject matter expert (SME) writes the initial text or first draft, a technical communicator may have to break the text down into elements and tag it. When writing in small, defined information units or content modules, technical communicators must always be aware of the XML hierarchy and rules, which can be very complex and hinder the writing process, because it is not as free flowing as content they may have written in the past (Yeats and Hull 253). When a technical communicator is required to write while thinking of the proper text elements, and also consider multiple audiences at the same time, it is easy to see how difficult the documentation process can become with XML-based single sourcing (McGovern 2003a qtd. in Albers 168).

Another point to remember is that a lot of times, when developing modules (of text in XML) in a structured writing situation, "the writer does not immediately see the completed form in which the document will be received" and the text that is written will always be created and arranged differently than it will be eventually presented (Sapienza 402). Because of this, technical communicators are encouraged to try and visualize during the documentation and design process what the final presentation will look like, which can often be difficult. However, having concern for the end user and foresight on the delivery of information is something that technical communicators are skilled at. This aspect will just be even more important in the XML-based, single sourcing method of documentation.

The increased complexity also applies to managers of technical communication departments who are in charge of (or tasked with) implementing an XML-based single sourcing

system. If the managers have delegated the responsibility of creating the system to other workers, then they should work out a plan and design method with them to ensure that the system has a high degree of usability and effectiveness.

XML is a tool that helps us manage, present, and deliver information more effectively. Technologies such as XML, Content Management Systems (CMS) and single sourcing allow us to construct a good solution for the transfer of high quality content to the users, but they are not solutions in themselves (Albers 2005, p. 168). There is a lot more involved in meeting the goals of technical communication than just accessing helpful tools. XML and single sourcing is not necessarily the best solution for all organizations. XML-based content management and single sourcing systems can be very expensive for organizations to start up and implement, depending on how advanced they are. Before implementing these systems, organizations would do well to examine whether "using traditional tools in new ways" could help them achieve the increased production and quality that they are aiming for (Williams 322).

Conclusion/Summary

XML should continue to be relevant for structuring and organizing content, as long as it does not become obsolete like so many other computer languages have in the past. Another important point is that while XML facilitates single sourcing, it is similar to single sourcing in that it "is not a hard and fast requirement. Rather, the hard and fast requirement is to communicate information to the user" and in the most effective manner (Albers 2005, 164). The

technical communicator's main concern should be "ensuring the information fits within the current reader context and is relevant to that context," thus accomplishing the goal of assisting the end user in what he or she is trying to achieve via the product (Albers 2005, 164). If implemented in a manner where technical communicators are informed of the technology and involved in the development processes, and the usability and clear communication for the end user remains a priority, XML-based single sourcing can be a very valuable tool for the managing of content, and for the effective reuse of content in multiple platforms.

In the next chapter, I will discuss other related technologies that are emerging similar to the manner in which XML has continued to emerge. Some of these technologies are Digital Asset Management (DAM), advanced Content Management systems (CMS), and DITA (Darwinian Information Typing Architecture). These fields, systems, and technologies are all related to single sourcing and XML, and I will briefly discuss how they are related, what they mean to technical communicators, and how their impact fits under the umbrella of technical communication.

CHAPTER FIVE: OTHER EMERGING TECHNOLOGIES SUCH AS ADVANCED CMS AND DIGITAL ASSET MANAGEMENT (DAM)

In this chapter, I will briefly discuss a few emerging technologies related to single sourcing and how they fit into the overall methodology in some organizations, how they benefit the field of technical communication, and how they impact the technical communicator.

Single Sourcing, Content Management (CMS), and Digital Asset Management (DAM) systems are becoming more and more prevalent in the field of technical communication. Many organizations are now using single sourcing and CMS for "identifying, storing, and retrieving chunks of information" (Williams 322). These systems, along with Digital Asset Management (DAM) systems, are also being implemented to store various types of digital media and multimedia.

There are several reasons these systems are being placed on corporate Intranets and on the World Wide Web. Organizations are becoming increasingly aware of the value of information, knowledge, and digital assets such as video, photos, and graphics. It serves their interest, and the needs of their users to be able to easily store, access, and retrieve information and media when they need to. When information stored in various formats cannot be shared or accessed easily, it often results in a loss of time and money: time spent searching and re-sending information and money spent re-creating information that already exists. Content and data cannot be used if the prospective users cannot find it, or give up looking in frustration, and that same

content needs to be easily accessed by technical communicators who are creating new content, along with organizing and structuring existing information (Williams 322).

Advanced Content Management Systems (CMS)

Content Management is a process of categorizing and organizing information for future retrieval and development (Hackos 2). This definition makes it clear that single sourcing is something that falls within the realm of content management. Often content management and single sourcing are mentioned in the same sentence, because single sourcing is an issue that is more relevant to technical communication, while content management is a topic that is an issue in a broader range of fields. Another way to think about the two topics is that single sourcing is a process or practice that can be part of a larger Content Management System (CMS) that is used by an entire organization (Williams 323, Hackos, Rockley).

Advanced or full-fledged content management systems (CMS) are generally used by large organizations that work in the field of technical communication. Single sourcing, via an advanced CMS, has shown that it can lower costs and increase quality and efficiency (Hackos 2002, Junco & Bailie 2004, and Albers 2003). CMS have also proven to be effective for producing documents that need to be translated to other languages, and for producing documents in a wide range of formats and document types (Hackos 2002, Kramer 2003, Sapienza 2004, and Steele 2001).

A Content Management System (CMS) is “a software layer controlling a database

management system that stores either the content resources themselves or references to those in a file management system. Authors check modules of content into the repository and retrieve them from it through a CMS" (Hackos 77). The modules of content and "information objects" that are inserted and retrieved from the CMS are usually text, coded in XML and containing descriptive metadata. When an author such as a technical communicator retrieves the information objects from the repository in the CMS, he or she can assemble and link them together to form documents. Finally, they are produced and delivered in various output formats such as:

- Traditional print publications
- PDF facsimiles of print publications
- Web pages of HMTL or XML (some including CSS: Cascading Style Sheets) for various internet browsers
- Web pages using XML-based style transformations (XSLT)
- Electronic books
- WAP (Wireless Application Protocol) for cellular phones
- Formats suitable for PDAs (Personal Digital Assistants)
- Online help systems embedded in software products

Technical communicators working with these systems can insert the desired output format by assembling topics and information contained in the database into traditional word processing tools, desktop publishing tools, slide shows, and other media with the style sheets in each of

these tools providing this formatting (Hackos 62-63). If set up properly, using a CMS is a very efficient and effective way to create communication products.

Most CMS have "industry standard functions" such as categorization (categorizes document elements), searching capability (integrates search engines for searching documents by context and keyword), security and version control (tracks versions of same documents so that multiple writers can use documents without overwriting each other; earlier documents can also be accessed and reused), and workflow (tracks workflow of documents for following the development process) (Ament 191). Depending on the company's situation or need, they may require more capabilities than these, but it is likely that any CMS that did not contain these standard functions would not be effective.

Advanced or high-end CMS "serve as complete authoring, conversion, and management systems. These systems are often used to generate tremendous amounts of dynamic content for online periodicals (Ament 191). These advanced systems are generally put into use by large corporations, who have the "tremendous amounts of dynamic content" that needs to be managed and disseminated throughout the company during the creation of products.

The advantages of a CMS, especially an advanced CMS, are significant. By using a CMS, organizations ensure that their content is:

- Accessible to everyone in the organization
- Available in one virtual location without having users search on multiple servers on individual hard drives (which can be very time-consuming)

- A single point of access so that users can be confident that they have found the latest version of the information
- Labeled according to when they were written and by whom
- Tracked through a workflow process that records when and by whom it was modified
- Managed under a security process that ensures they can be checked out and modified by certain individuals, read by other individuals, and not accessed by all by still more individuals inside and outside the organization (Hackos 77-78).

These advantages can not only save organizations large amounts of time and money, but they are also a well-organized, consistent, reliable, and safe way to store information.

The last bulleted point about the security process is something that more and more organizations perceive as the most valuable advantage of an advanced CMS or similar system. Many advanced CMS have the capability to require different security levels for different levels of employees and for different processes. Some information can be viewed but not modified unless authorized by a manager or supervisor, or the individual who is most responsible for the information. Other classified information or information that needs to be confidential for some employees can only be viewed by management or executives that are authorized to view it. This feature can save organizations a lot of hassle because they are assured that any employee searching for, viewing, or modifying information in the CMS is authorized to do so and they can

also keep track of any changes that are made.

Advanced CMS can also deliver substantial benefits if they have been constructed using a strong, effective Information Model that labels information according to the ways it will be accessed and can be reorganized in many ways, depending on who is looking at it (Hackos 134). The information model also helps make information accessible to all users, both experienced and inexperienced. It decreases the amount of time spent searching for information and possibly not finding what you are looking for, and keeps documents from being needlessly rewritten, which also increases productivity (Hackos 134). Mention "increased productivity" or "saving time and avoiding frustration" to a company executive or organization CEO and he or she will likely warm up to implementing a CMS, provided that the system can deliver on its promise. While advanced CMS are very expensive to purchase and implement, they have also proven to be very effective and, in some cases, pay for themselves in the time and money saved by retaining information and by not using manpower to recreate existing information.

Once an organization decides that they would benefit by purchasing and implementing an advanced CMS, there are several things to consider. Successful implementation of a CMS often follows a strong requirement analysis from an outside source or consulting firm (Junco and Bailie 208). In addition, there can be many other "adjunct activities required to address business concerns such as an adaptation of workflow and technologies" (Junco and Bailie 208). In short, before purchasing what could be an extremely expensive system, organizations are generally advised to evaluate what type and what level of CMS they need, the best way for it to be

implemented, what funds, labor, and time-frame it will take to implement it, and whether any of their current business processes need to be altered or removed before the CMS is put into place.

Choosing the appropriate or most effective CMS can also be a complex decision. Many of the systems and tools for content management are intertwined and related- "document management, collaboration and versioning tools, DAM, learning content management, and Web content management all fall under the CMS umbrella, which also brushes up against topics like CRM, document warehousing, and knowledge management. Each one of these areas is distinct of the others, but they are often confused" (Bronder). It is important for organizations to know exactly what they need before not only purchasing, but before they even start looking for prospective systems to acquire.

As mentioned earlier in this chapter, CMS, especially advanced ones, can be very expensive. "Complete enterprise-class solutions" can cost up to $500,000 and take several months to implement, which also could contribute to high consulting fees that sometimes cost as much as six times the initial cost of the package (Bronder). An intelligently-run organization would not undertake such an expensive implementation unless they are aware of the all the costs, benefits, and logistical considerations the system creates. However, there are less costly options, such as a "Pure Web CMS," which can be implemented for "well under $250,000" and the implementation time is short, making the total cost of owning a Web Content Management (WCM) system less than three times the cost of advanced CMS software. A company called FatWire currently markets a product for department-level portals that averages only $25,000;

cheap compared to an advanced CMS (Bronder).

New types of CMS are also being created, “based on databases and software revision control systems” (Dick 85-86). Large companies, the types that implement these advanced content management systems such as IBM, Microsoft, and Oracle perceive XML content management to be a promising market. However, no matter what type of solution is selected, they all have “the same basic components: Repository, Version Control, Deployment Manager, and Group Authoring (Dick 85-86).

In the new changing landscape of content management, especially with the popular database driven systems that use XML, the same content could contain “a document, a DTD, several external links, and several style sheets” (Dick 87). Enabling all of these types of content to co-exist in a system and work with each other almost requires a sophisticated CMS. Organizations that need to manage massive amounts of dynamic content, or information in general, greatly benefit from advanced CMS that assist in the storing of information for efficient reuse and retrieval.

Advanced CMS are relevant to technical communicators that work for large corporations such as IBM or Siemen’s, because if they are single sourcing technical documentation, their process for creating information products likely is completed using an advanced CMS. It is important that all technical communicators who are already involved in single sourcing, or could be soon, are aware of advanced CMS, how the systems work, and how it affects their job.

Digital Asset Management (DAM)

Like the practice of single sourcing and content management systems, Digital Asset Management (DAM) is an emerging field for structuring, organizing, and categorizing digital assets, which include "everything from artwork, logos and photos to PowerPoint presentations, text documents and even e-mail" (Ross 1999). DAM can be described as a flexible, searchable storage method that stores images, video, audio, and text in a database or media catalog. Metadata is then attached to the data, which facilitates the management of the files and searching for the files (Gibson 2005). In the same way as a Level 3 single sourcing initiative would be organized, DAM involves:

- Creating an efficient archive that can hold digital resources (such as images, audio, and text) and the metadata that describe them
- Implementing an infrastructure to ensure that these electronic data are managed and preserved in such a fashion that they will not become obsolete
- Implementing search facilities that enable users to identify, locate and retrieve a digital object

Source: (NINCH- National Initiative for a Networked Cultural Heritage 2002)

DAM systems are very helpful in reducing the amount of information that is lost by an organization. Research has shown that "the average creative person looks for a media file 83

times a week and fails to find it 35% of the time" and that DAM can reduce that figure to only 5% (Ross 1). This phenomenon is related to single sourcing and content management in general because it helps make data, information, and digital media easier to access, saves time, and reduces costs in reproducing work that already exists. Numerous large corporations are now using DAM systems to keep track of massive amounts of images and documents. Companies such as Revlon and The Coca-Cola Company use DAM to manage their advertising materials (Gibson, Bronder).

DAM can provide significant savings to an organization, as much as between 8:1 and 14:1 ROI (Return on Investment) according to research (Ross 1). Typical savings from DAM are in labor reduction (allowing employees to spend less time locating assets and more time working on current projects), re-purposing (ability to find and research existing work and reuse valuable assets from previous projects), and also in workflow efficiency, because DAM enforces a consistent workflow process (Ross 1). DAM also allows organizations to maximize the use of digital objects, ensuring that their value is maintained, which also results in "institutional savings" (NINCH). Other benefits of a DAM system are:

- Centralizing discovery and access
- Coordinating disparate projects as part of a coherent whole
- Centralizing authorization, security, and tracking systems
- Unifying organizational solutions to managing copyright and IPR
- Reducing duplication of effort and resources

- Saving time for the creators and users through organizational structure and centralization of data (NINCH 2002)

DAM is needed because digital assets have value and they need to be retained safely (Gibson). These digital images and text, when stored in a DAM, can be easily reused and re-purposed, and they can also be "capitalized as financial assets" (Gibson).

So how does Digital Asset Management (DAM) work? Please refer to Figure 1 on the next page.

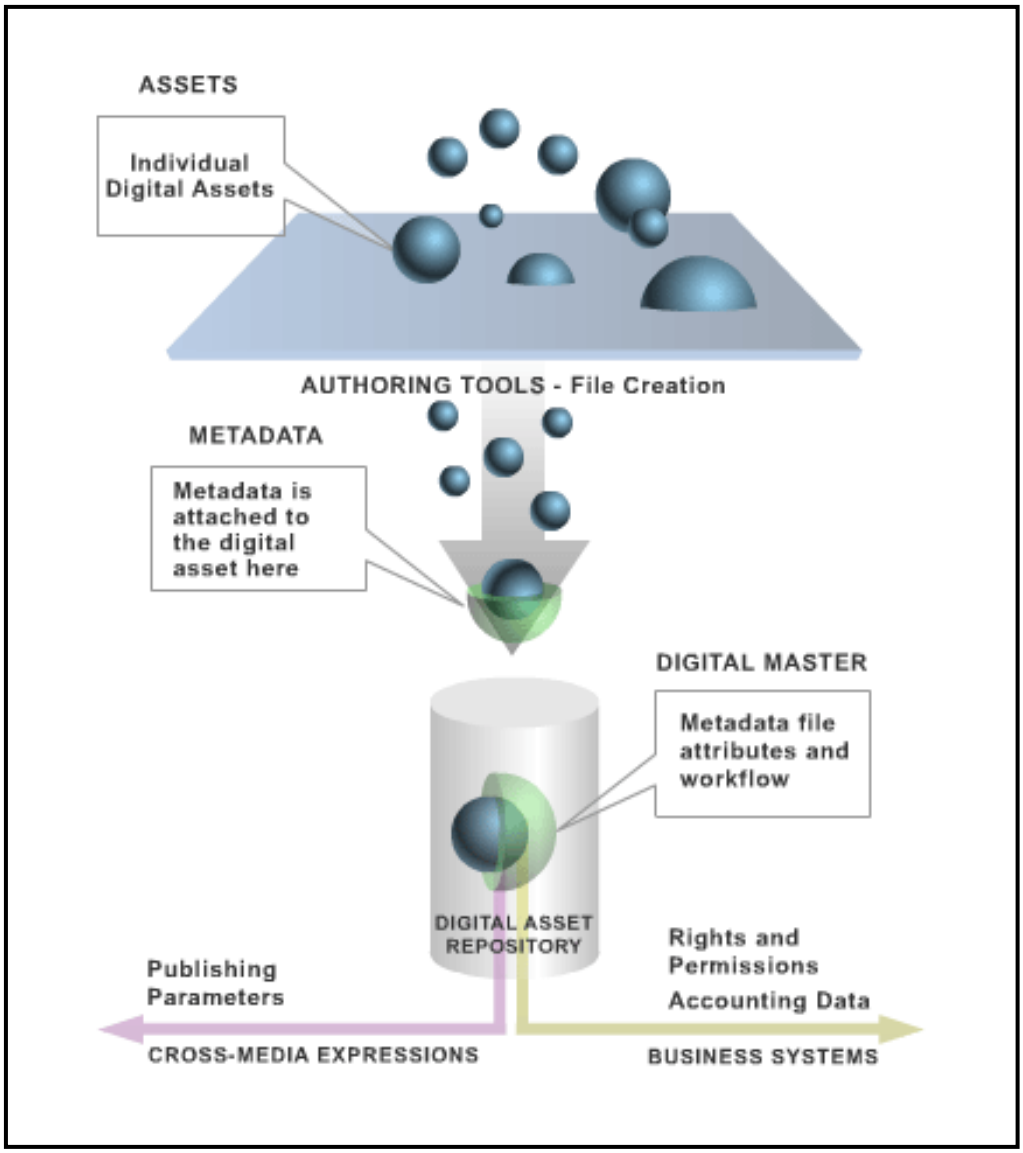

FIGURE 1: "HOW DAM WORKS". Gibson, Ian. Microsoft PowerPoint presentation. STC Orlando Chapter Meeting. The University of Central Florida. January 2005.
http://www.dm.ucf.edu/~igibson/stc/index_files/frame.htm

In most DAM systems and digital asset repositories the content is physically stored inside a secure database. As discussed before, this results in several benefits: "security levels, replication, referential integrity, and centralized data management. Also included is the comfort of full hierarchical storage management and disaster recovery" (Ross 3). The peace of mind in knowing that digital assets are safe, will not be lost permanently, and can be easily found and accessed is a major positive for organizations that decide to use a DAM system.

There are several levels and types of DAM systems. For example, a DAM system "may be as simple as the directory of files on a hard disk, each file containing a digital asset, with an accompanying database that stores descriptive and administrative metadata for each of the files" (NINCH). A simple DAM system such as this can be built from an "off-the-shelf database management system such as FileMaker Pro, MS Access, or one of the larger SQL database systems, like MySQL or Oracle" (NINCH).

There are also DAM systems on a very large scale and software products that have been developed for large-scale website management. Some of these systems are more geared towards text or image-intensive collections; while more advanced systems can handle a wide variety of media (NINCH). At its most advanced level, a DAM system "can radically transform the way an institution manages digitization and handles access to the digital assets" (NINCH). No one provider or producer of DAM systems offer a solution that is ideal for every company, and it is possible that no single solution will solve all of an organization's needs. Henry Norris, former technology solutions manager for Nine River Technology, which has developed successful DAM systems, states that "DAM is an evolution. It's a constant work in progress" (Ross 7).

Ross suggest that, during the implementation of a DAM system, communicators map out the workflow of their imaging and storage processes, along with figuring out who the users will

be and what they need to see on the screen to complete the task they are working on (4). This is very similar to what several experts on single sourcing have advised and can be applied to single sourcing and content management. Just as organizations want to be able to reuse effective documents via single sourcing, more and more DAM systems are being created because of the "growing belief that digital resources are, at the very least, as valuable as the time, effort, and finance that have gone into their creation" (NINCH 2002).

Metadata and DAM

Metadata for digital assets are generally classified in three categories: descriptive metadata (about the content and form of the digital asset to enable search and retrieval), administrative metadata (about the history of the asset and policies associated with it), and structured metadata (information about the internal structure and relationship of resources that facilitate their navigation and presentation (NINCH). At this stage of technological innovation and the creation of more DAM systems (and in the foreseeable future), "digital assets are pretty much unusable without metadata (NINCH).

Berners-Lee states that metadata was "the first form of semantic data on the Web" (181). Metadata is important because it describes "catalogue information about who wrote Web pages and what they are about; information about how Web pages fit together and relate to each other as versions, translations, and reformatting; and social information such as distribution rights and privacy codes" (Berners-Lee 181). All of this information also applies to digital assets contained

in a database, and not just for Web pages.

The World Wide Web Consortium (W3C) is currently coming up with "schema languages," which creates a master list of the data terms used in a document, one for XML and one for RDF (Resource Description Framework). These languages will be able to tell any person or program about the elements of the web page they describe, which will help define how databases (such as CMS or DAM) are represented (Berners-Lee 184). This should make single sourcing, content management, digital asset management (DAM), and accessing content on the web, among other things, that much easier.

These new technologies and ways to communicate on the web are part of what Berners-Lee calls the "Semantic Web": a "web of connections between different forms of data that allow a machine to do something it wasn't able to do directly" (Berners-Lee 185). Berners-Lee prophesizes that, when the Semantic Web emerges, "the day-to-day mechanisms of trade, bureaucracy, and our daily lives will be handled by machines talking to machines, leaving humans to provide the inspiration and intuition" (159). If computers can communicate with each other through "inference" or "schema" languages, and convert data from one format to another themselves, then humans will have more time to focus on what they are producing, such as a single source document, and not have to be bothered with how the document, or anything else they are working on for the web, is able to be accessed or used by others from a communication standpoint.

Digital Asset Management (DAM) systems should continue to increase in number,

making even more visuals and images available to store and use on the web, and in technical communication projects such as online help. The increase in DAM system only adds to the explosion of documents and images happening on the World Wide Web already. When implementing a DAM system, just like single sourcing, it is important to develop a complete strategy that covers the process from start to finish (NINCH). Technical communicators are ideal for working with DAM systems, especially if they already have experience working with single sourcing, XML, and content management efforts. Just as in single sourcing, technical communicators are skilled at storing, categorizing, and reusing information, and at making sense of where a piece of information, or a digital asset, would best fit within a communication product.

CHAPTER SIX: FINDINGS, CONCLUSIONS, AND SUGGESTIONS FOR FURTHER RESEARCH

There is no doubt that single sourcing is having a profound effect on the field of technical communication and on the technical communicator. As more and more organizations adopt single sourcing (XML-based and non-XML based), content management (including advanced CMS), knowledge management, Digital Asset Management (DAM), and similar technologies, technical communicators will see a broad and far-reaching impact on their job, and on how they produce documents and communication products.

The progression of single sourcing and related methodologies in the last 5-10 years has been astonishing. When these methodologies first came to prominence in technical communication and became a major point of discussion in our field (about a decade ago), many technical communicators and organizations were skeptical about how much impact it would have and about whether or not it was a positive or negative development for the field. Many people in the field still remain skeptical about the development of single-sourced documentation and structured content, but it is clear that the field is moving more and more in that direction.

When single sourcing methodologies were first adopted, they mainly focused on Rockley's Level 1 of single sourcing, where content remained identical to its previous form, but was reformatted for different types of media. This type of single sourcing still remains and is still being used by many organizations, a lot of which may never feel the need to move to more advanced types of single sourcing because of the size of the organization and because they do not

see a major cost benefit in switching.

Rockley's Level 2 of single sourcing remains the most common type of single sourcing, where the basic content remains the same but things are added to that content to make it compatible for different audiences, different output formats, and to meet the needs of the user. This type of single sourcing has shown to be very effective because it still takes into account the growing needs of the user, not just on making content production more efficient for the business.

Rockley's Level 3 is the fastest growing type of single sourcing, especially in large organizations. Organizations that implement this type of single sourcing create content, often in the form of modules and chunks of content tagged in XML code, which is entered into databases and can be plugged into any type of document, for any format, audience, or purpose. When this content is created via the use of an advanced single sourcing or content management system, it saves large organizations up to millions of dollars in avoiding labor costs in recreating or rewriting documentation, and in the efficient ability to produce documents in a wide variety of formats from a single source. This type of single sourcing is mainly used by large organizations because it is very expensive to implement. This type of single sourcing is also highly dynamic because it can be used in so many different ways and can also, in some situations, enable the user to pick and choose which content, and in what form, they are presented with based on the information and content they need.

The potential problem with this type of single sourcing is that, in producing content in the form of XML code that can be taken in pieces from databases and plugged into various

documents, the concern for and focus on the user will be lost while enabling the production of large amounts of documentation with ease and efficiency.

Organizations that implement Rockley's Level 3 single sourcing, "dynamic customized content," must be careful to write, produce, and design the content while keeping in mind the rhetorical benefits for the user, and with the goal of still producing the most effective type of communication. This type of single-sourced content takes longer to write, and involves more technical communicators utilizing their skills and training in writing, information design, and rhetoric if the goal is content that is highly effective and highly usable for the end user.

The "craftsman model" of producing technical documentation, where a single technical writer creates a document in successive chapters, performing his or her own usability tests, and writing the content with little feedback and consultation of other writers in the organization is for the most part disappearing from most technical publications departments. While some smaller and more traditional organizations will keep the craftsman model from completely disappearing, the continued movement to single sourcing and content management requires that documents and communications be produced by multiple writers, information developers, content developers, and other types of technical communicators collaborating on documents and communication products. For content to be dynamic, compatible with the ever-increasing number of output formats, and customized for different users and audiences, it must be produced by single sourcing methodologies and database-driven technologies.

One thing that technical communicators who are employed by organizations that

implement single sourcing methodologies will have to deal with is the loss of some creative control and ownership of the content they produce. Some technical communicators, especially the ones that have been in the field for many years, have resisted the change to single sourcing because they feel it disenfranchises them as writers and turns them into mere providers of tagged content, instead of creative producers of whole documents. However, as more and more organizations switch to single sourcing methodologies, those that resist may be left behind, marginalized, or even fired from their jobs. If an organization is convinced that the marketplace they operate in requires single sourcing and structured content to create the products they need to produce, technical communicators will have to go along with today's market or apply with firms that still use traditional methods, although those firms could soon move to single sourcing as well. What is more advisable is that technical communicators broaden their skills to include more emphasis on information design, writing in structured environments, becoming proficient in markup languages such as XML, and acquiring a greater knowledge of the new technologies that make single sourcing, content management, and related methodologies possible.

A lot of discussion in the research on single sourcing has covered whether or not the move to single sourcing is a positive or negative for the technical communicator. Several researchers make the claim that single sourcing makes things easier for the technical communicator because they no longer have to worry about layout and design and can focus on writing superior content. Other researchers say that the technological innovations that come with single sourcing can make the job too complex, and the difficulty of writing chunks of text for a

variety of different formats and audience causes the move to single sourcing methodologies to be frustrating and a negative experience for technical communicators.

However, the experience of each organization and its employees that move to single sourcing methodologies is different. Each group of technical communicators and each government agency, large corporation, or small firm must plan for the new environment of creating technical communication products where end users desire and expect dynamic information, customized to their specific needs and purposes. The dissemination of this type of content and information cannot be done without the use of various single sourcing methodologies, depending on the situation.

The best way for organizations that need to provide the dynamic and customized content required by the end users of today is to implement strategic plans for the implementation, to consider how they can prepare and train their employees for a smart transition to the new technology. As stated earlier in this thesis, when the job responsibilities change for technical communicators from being sole writers of documents to other positions such as information developer, content developer, metator, knowledge manager, and other positions, they must adjust to the change. While some may feel disenfranchised and dislike the decrease in writing, content production, and ownership of documents, it is essential that they realize their other inherent skills and training in designing and evaluating information. In some cases, technical communicators can be more valuable to an organization in these capacities, where they can provide an expert opinion on the best way to communicate technical information to people that need the

information, by not necessarily changing or translating the information so it can be more easily understood, but rather by assisting in the creation of dynamic information that is both usable and effective to users in a variety of formats.

The practices of single sourcing, content management, and DAM are expected to continue to increase in the coming years. There are more documents created every day, many of them being placed on the World Wide Web. There are also more devices and new technologies created every year that could potentially become another "output format" that text and images will have to be compatible with to support the growing consumer market. Technical communicators must adapt to this changing environment and to the new innovations in technology. Information and content design can be an area where some technical communicators that enjoy this aspect of the work can succeed in the field. Others that have also leveraged their wide array of skills may fill the need of creating and managing information systems such as single sourcing, CMS, and DAM systems. This is an area where technical communicators may be able to raise their status in organizations by becoming knowledge managers and information developers.

If the education and training in the field continues to broaden the knowledge base of technical communicators, they will remain valuable components of organizations and can succeed in almost any position they choose or where their organization has a need. Technical communicators must see themselves as important role-players in the overall process of communicating rhetorically effective, highly usable, and quality technical content to users:

> Whatever the discipline, we communicators can no longer define ourselves as trainers, marketing communicators, and technical communicators.
>
> Instead, people who have worked in these disciplines will skillfully produce a variety of communication products, and, in the future, we will define ourselves by our roles in the communication process rather than the type of communication products we produce. These roles include: production assistant, information developer, expert information developers, information designer, project manager (Carliner 162).

It is unlikely that single sourcing is just a "fad", and more likely that the practice will increase, but if technical communicators can adapt to the changing of their roles, and focus on what got them where they are today: their ability to write, organize, and produce content that is easily understood by others, then the move to single sourcing methodologies should be something they can handle like pros.

Suggestions for Further Research

Additional research is needed on the effects of single sourcing and related technologies' implementation on the technical communicator, on his or her job responsibilities, status, and career path. Much of the current research on single sourcing focuses on the effect on the organization and how the new technology can be such as positive development for business. Other researchers have countered the decidedly positive articles and published research on single sourcing by pointing out the negative possibilities that can happen when single sourcing

methodologies are implemented, such as a decrease in quality, higher job complexity, lack of concern for the user, and the disenfranchisement and outsourcing of technical communication jobs that can happen if single sourcing is not implemented with strong planning strategies, preparation, and evaluation of the technology. Whether those in the technical communication field like it or not, single sourcing methodologies will likely increase in the coming years. What would be more valuable to students and professionals in the field is research on how to adapt to the technology and implementation that comes with single sourcing methodologies, how to broaden skills and prepare for structured content environments, specific examples of the experience of role changes and new job responsibilities, and on the best way to train for a workplace situation where additional skills are needed to succeed.

Additional research is also needed on XML and its effect on technical communicators. Some organizations are already using DITA (Darwinian Information Typing Architecture) along with XML to produce "task-oriented, audience-oriented information that is reusable, useful, and standardized, all at the same time" (Day et al 250). More research is needed on DITA because it is another important technology for technical communicators in the field and for those involved with single sourcing methodologies.

Digital Asset Management (DAM) is another emerging technology and type of system where there is almost no current research relating it to technical communication. All types of organizations, including those that employ technical communicators, are building or purchasing DAM systems and this is another area that parallels single sourcing, knowledge management and

content management because it involves a new way of producing and defining information for more efficient delivery to users.

Additional research is needed on all of these technologies so that technical communicators can be aware of what they may encounter in their jobs, but it is important to remember that the implementation of new technologies, new methodologies, and new output formats will not be positive developments for anyone- writers, information developers, or users- if the ultimate goal is not producing quality communication products that are efficient to create, provide customized information to a variety of users in multiple formats, and achieve the goals of the 21st century marketplace.

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