NOTE TO USERS

Page(s) not included in the original manuscript and are unavailable from the author or university. The manuscript was scanned as received.

154 & 173

This reproduction is the best copy available.

UMI®

Graduate School Form 9
(Revised 7/94)

PURDUE UNIVERSITY
GRADUATE SCHOOL
Thesis Acceptance

This is to certify that the thesis prepared

By Robert Bergland

Entitled Downsizing and Upgrading: A Manufacturing Firm's Move to Electronic Distribution of Documents

Complies with University regulations and meets the standards of the Graduate School for originality and quality

For the degree of Doctor of Philosophy

Signed by the final examining committee:

Patricia A Sullivan, chair

David Blakesley

Jannice Lauer

Graham Smart

Approved by: _____ 10-24-2002
Department Head Date

☐ is
This thesis ☒ is not to be regarded as confidential. Patricia A Sullivan
Major Professor

Format Approved by:

Patricia A Sullivan or _____
Chair, Final Examining Committee Thesis Format Adviser

DOWNSIZING AND UPGRADING: A MANUFACTURING FIRM'S MOVE TO ELECTRONIC DISTRIBUTION OF DOCUMENTS

A Thesis

Submitted to the Faculty

of

Purdue University

by

Robert Bergland

In Partial Fulfillment of the

Requirements for the Degree

of

Doctor of Philosophy

December 2002

ProQuest Information and Learning Company
300 North Zeeb Road
P.O. Box 1346
Ann Arbor, MI 48106-1346

ACKNOWLEDGEMENTS

Usually, the bigger the project you undertake, the more help you need. This dissertation was no exception. Without the assistance and persistence of the following people, I would not have come close to having a need to write an acknowledgements page:

Patricia Sullivan, for serving as a mentor while at Purdue and staying with me all these years as my dissertation chair and for being so supportive

Janice Lauer, for guiding me through my first few years of teaching and graduate school and doing me this last favor of serving on my committee

David Blakesley, for graciously agreeing to be on committee for someone he had never met

Graham Smart, for joining my committee and for sticking by the commitment when it would have been very easy not to

My parents, for being so supportive of my education for so many years

My children, for their patience when their father needed to spend time with this dissertation instead of with them

And most of all, for my wife Tammy, who not only helped with tasks such as tabulating survey data, but who has been my friend, comforter and motivator during graduate school and the years completing this dissertation

TABLE OF CONTENTS

Page

LIST OF TABLES vii

LIST OF FIGURES viii

ABSTRACT x

CHAPTER 1: DOWNSIZING, POWER AND LITERACY 1

Literature Review 5

Electronic Publishing and Technical Communication 6

Publishing Technologies 12

Downsizing and deskilling 17

Technological Literacy 24

Theoretical Frameworks for the Study 27

Research Questions 34

Theory of Technology 34

Technology and Ownership/Management 35

Technology and the Worker/Technical Elite 38

Technology and the User/Customer 48

Technology and the Customer-Company Culture 50

Addendum 51

Hypothesis 52

Outline of Dissertation 53

CHAPTER 2: METHODOLOGY FOR INVESTIGATING DOCUMENT PRODUCTION AND DISTRIBUTION 56

Topic/Site Selection and Company Background 56

Page

Overview of the site 57
Overview of Document Production/Distribution at the Company 58
Methodological Choices 58
Ethnographic methods 61
Survey methods 64
Analyzing/Representing the Data: Creating a Chronology and Description of Culture 71
Analyzing/Representing the Data: Examining Power, Computer Literacy and Downsizing/Deskilling Issues 73
Analyzing and coding the data 73
Representing the Data 79
Literacy 81
Downsizing/Deskilling 82
Relationship with Company 83
Data Collection Phases/Timeline 83
Role as participant-observer 85
Planned research methods which were not able to be implemented fully 87
Discourse analysis 87
Discourse based interviews 88
Counters 88
Collaboration in data collection, analysis 88
Researcher biases/ideology 89
Limitations and biases in the dissertation 90
The ethnographic nature of the studies limits its transferability 90
Site studied is not typical of many environments 91
Biases 92
Limitations 94
CHAPTER 3: THE CULTURE AND HISTORY OF DOCUMENT PRODUCTION AND DISTRIBUTION 96

Page

Overview of company and products....97
Global organization....97
Site organization....99
Company health....99
The Key Players: Ownership/Management, Technical Elite and Customers....100
Ownership/Management....100
Technical Elite....102
Sales/Distributors....103
Customers....104
History of Downsizing and Document Production/Distribution 1971-1997....106
The Building of an Internal Publishing System: Document Production and Distribution 1971-1991....106
Document Production and Distribution 1991-1996....115
Document Production and Distribution, 1997....118
Overall Analysis of Organizational Charts....120
CHAPTER 4: CULTURE AND THE ROLE OF POWER, LITERACY/TECHNOLOGY, AND DESKILLING AND DOWNSIZING....128
Introduction....128
Downsizing/Deskilling....129
Literacy....129
Access/Literacy of Customers....132
Customer Survey results....133
Distributor survey results....143
Literacy of branches and personnel....146
Analysis....149
Distribution Technology....151
Power....158
Power Relationship between the Company and Customers....159
Internal and External Power in Document Decisions....163

Page

Electronic media/mail distribution....170
Electronic files/network distribution....171
Hypertexts/network distribution....172
Power, Interactivity and the Web....175
Culture and the impact of Speed, Image, Convenience and Cost....179
Speed, Convenience, Image and Cost....180
Changing the medium=changing the image of the company?....186
Culture and Power: Preferences of the Company and Customers....194
Customer vs. Company preferences....196
CHAPTER 5: CONCLUSIONS AND IMPLICATIONS FOR TECHNICAL COMMUNICATION, TECHNICAL COMMUNICATION PEDAGOGY....207
Analysis and Discussion of Decisions Made....207
Why was the electronic publishing plan a failure?....208
What should the company have done?....215
Ramifications of layoffs and failure to implement electronic publishing....222
Was not implementing an Electronic Publishing system really a failure?....224
Implications for Technical Communication Pedagogy....225
Platform....225
Selection of media....225
Non majors need to take a technical communications course....227
Preparation for employment as a consultant....227
Implications for technical communicators....228
Electronic Publishing....228
Show value as a technical communicator....229
Importance of Technical Communicator to be a User Advocate....231
Implications for Theory....231
Suggestions for Future Research....233
BIBLIOGRAPHY....235
VITA....243

LIST OF TABLES

Table Page

Table 1.1 Kalmbach's Evolution of Publishing Technologies 11
Table 2.1 Data coding scheme table--Power 74
Table 2.2 Data coding scheme table--Literacy 75
Table 2.3 Data coding scheme table--Downsizing 76
Table 2.4 Data coding scheme table--Culture 77
Table 3.1 Document production/distribution history 114
Table 4.1 Document production literacy 148
Table 4.2 Document Production Technology--1997 148
Table 4.3 Distribution Technology January 1995 153
Table 4.4 Distribution Technology August 1997 155
Table 4.5 Levels of Power and Document-Related Decisions 164
Table 4.6 Technological features of websites 176
Table 4.8 Speed 183
Table 4.9 Change in image 187
Table 4.10 Convenience 188
Table 4.11 Cost 191
Table 4.12 Customer wants vs costs 200

LIST OF FIGURES

Figure Page

Figure 3.1 Worldwide Organization of Company 1994 97

Figure 3.2 North American Organization of Company 1997 98

Figure 3.3 Document production 1971 107

Figure 3.5 Document production 1979 110

Figure 3.6 Document production 1982 111

Figure 3.7 Document production 1989 112

Figure 3.8 Historical Events in document production 1990-1996 119

Figure 3.9 Document production 1990 122

Figure 3.10 Document Production 1993 123

Figure 3.11 Document Production 1995 124

Figure 3.12 Document Production Future 126

Figure 4.1 Fax survey results 134

Figure 4.2 CPU survey results 135

Figure 4.3 Operating system survey results 136

Figure 4.4 CD ROM ownership survey results 137

Figure 4.5 CD speed survey results 138

Figure 4.6 Modem survey results 139

Figure 4.7 Email address results 140

Figure 4.8 WWW access survey results 141

Figure 4.9 WWW downloading survey results 142

Figure Page

Figure 4.10 Power-literacy graph--Print 168
Figure 4.11 Power-literacy graph--Electronic Media/mail distribution..... 170
Figure 4.11 Power-literacy graph--Electronic network distribution 172
Figure 4.13 Power-literacy graph--Hypertext network distribution..... 174
Table 4.7 Power/interactivity between webpage and user..... 178
Figure 4.14 Importance of features to company and customers..... 195
Figure 4.15 Customer document distribution preferences 198
Figure 4.16 Customer document distribution preferences--first/last choices..... 201
Figure 4.17 Importance of hard copy to customers..... 203

ABSTRACT

Bergland, Robert, Ph.D., Purdue University, December 2002. Downsizing and Upgrading: A Manufacturing Firm's Move to Electronic Distribution of Documents. Major Professor: Patricia Sullivan.

The dissertation is an ethnographic study of the company/customer culture at an electric meter manufacturing plant from early 1995 to summer of 1997. The study focuses on the document production and distribution methods before and after layoffs in the mid-1990s. The company at its peak employed a many document specialists, but by mid-1995, none of those positions existed at the company, and the company planned to employ electronic publishing. The dissertation outlines the history of document production and distribution from 1970-1997 and analyzes the company's decision to distribute its documents electronically. A survey of customers revealed their capabilities and preferences for receiving documents. The company-customer culture is largely viewed through the theoretical lens of Feenberg's critical theory of technology. I show how the company took an instrumentalist view of the technology. In doing so, the company ignored the culture and literacy level of its customers. Had the company espoused a critical theory of technology, the result might have been more positive for the company and for the customers. I also examine the decision-making process and failure to implement an electronic publishing system from a literacy standpoint, looking at how those in power to make the electronic publishing decisions had a very low level of literacy in that area. In that same context, I discuss downsizing and deskilling and the role of the technical communicator and technical communication in workplace settings such as this.

CHAPTER 1: DOWNSIZING, POWER AND LITERACY

In their introduction to *Electronic Literacies in the Workplace*, Sullivan and Dautermann (1996) note that since Odell's and Goswami's landmark 1985 *Writing in Non-Academic Settings*, "few subsequent studies have developed the issues related to how technology shapes, and is shaped by, writing practices in actual workplaces" (p. xiii). The articles in their collection seek to fill that gap, and raise more questions, such as: How does writing technology respond to and affect material conditions of writing within particular corporate cultures? What writing conditions does the technology improve? Complicate? How does the presence of electronic media affect a company's writing environment? What social, financial or physical conditions of the writing environment are also affected?...How does technology relate to social roles in organizations? How are jobs changed, added, lost? (p. xxi-xxii)

The goal of this dissertation is to add to the number of studies which address the role of technology in the workplace and to help respond to the above-mentioned economic and social questions as they relate to technology. Specifically, this ethnographic study of the technological and economic forces at a Midwest manufacturing firm attempts to answer the question: How do the intertwined economic, social and technologic factors influence document production and distribution at one company?

In the process of answering that question, I will be examining the history of writing and publishing at the company, outlining how the company has changed from having a virtually completely in-house document production process--in which the writing, graphics, layout and printing was done by specialists within the company--to the current system of outsourcing and having any in-house work done by engineers without expertise in writing and production. I will also detail the company's decision to move toward electronic publishing and distribution, and analyze the successes and failures of that decision from the company, employee and customer perspectives.

In writing this dissertation and conducting this study, I hope to help fill three research gaps in professional writing: the role of technology in the workplace, the impact of electronic publishing on technical writing and the economic factors which shape document production and distribution All three of these areas are related to each other in this study. The technology being used at the company has influenced the move to electronic publishing, and vice-versa. Economics have impacted the technology available, the people who know how to use the technology, and the move to electronic publishing. Finally, overarching all of these arenas is the issue of computer literacy, since the decisions surrounding the technology and its use have been shaped by the knowledge--and in some cases, lack of knowledge--of the hardware and software and its potential and its drawbacks.

The first gap concerns the role of technology in the workplace. As Dautermann (1996) notes, "studies of writing in the workplace have seemed surprisingly reluctant to account for the influence of electronic devices on workplace composing" (p. 3). Likewise,

Sullivan and Porter (1995) believe the field of professional communication has "neglected to consider the immense influence of computers on workplace writing practices" (p. xi). This study examines the history of document production at one company and ties in that history with the technological advances in printing and in computer hardware and software. Taking a more narrow focus, I also hope to advance knowledge in the field by concentrating on how one technology in particular --the World Wide Web--has influenced this company.

A second, related area in which this dissertation attempts to make a contribution is in the field of electronic publishing. While there is a growing amount of scholarship concerning electronic publishing, much of it currently is centered on scholarly publishing . Even more significant in relation to this study is the absence of articles, dissertations and books which involve in-depth, ethnographic studies of companies which are going through the electronic distribution process. This dissertation takes a step toward reducing that gap by providing a detailed, two-year-long study which analyzes the electronic publishing decisions made by a particular company and how those decisions impact the customers, the company and the employees. While the results of this ethnography are not able to be generalized to other companies, the narrative of the process will hopefully inform both scholars and practitioners of some of the complications involved in electronic publishing.

The final gap the dissertation fills concerns the economic and social factors which are interrelated with the technology. The economic aspect is important in this study because it was money, or the lack of it, that provided the impetus for the changes in writing and publishing at the company. The move to electronic publishing at the site

studied was not being done as an upgrading measure. At most organizations, electronic publishing is a means of supplementing paper distribution to serve their intended audiences. In recognizing the differences between the media, many companies also alter their electronic versions of the documents to fit the drawbacks and capabilities of the electronic distribution methods. That description does not fit the company I have studied, however. This firm was not moving to electronic publishing as an upgrading measure, but rather as a result of downsizing. After economic hardships forced the company executives to lay off their print shop, graphic designer and document coordinator personnel, the company decided to distribute their documents electronically. In doing so, the company planned to replace--not supplement--their paper versions. In addition, they were not adapting the documents to fit the electronic medium, but planned, as William Horton (1993) has put it, "'dump' existing paper documents online." The end goal of the electronic publishing was to save printing, handling and mailing costs. As a result, part of this study concerns the history of downsizing in the publications department, since the number of publishing personnel is directly linked to the document production and distribution at the company and technological and economic factors. While this additional area complicates the study, it provides a richer background for the decision-making narrative. In addition, it also helps fill another need in professional writing: an ethnographic study of the effects of downsizing on technical communicators. As Barchilon (1993) noted, currently no workplace ethnographic studies have been done which address this issue, in spite of the pronounced effect of downsizing on the professional communication field in the past decade.

Tied in closely with the technologic and economic factors is the social aspect. At the heart of the use of any technology is the culture in which it is situated. How technology is viewed and used within that social group will determine its function, level of penetration and its future. The technological literacy of that group, as will be discussed later, can affect the success or failure in implementing any technological changes. The social element is further elaborated by James Kalmbach (1997). Kalmbach, in espousing a theory of publishing as social action, notes that "the most appropriate design and production values for any one publication have been rhetorically and socially situated" (88). Accordingly, I will be using an ethnographic method to fully describe the social situation which determines not only design and production values, but also the means of production and distribution.

LITERATURE REVIEW

In addressing all of these gaps—the role of technology in the workplace, the impact of electronic publishing, and the social, economic and cultural forces as they relate to technology and technical communication, I will be relying on literature from a wide array of sources. I have broken this material down into four main categories: electronic publishing background (which includes definitions, history and theory), electronic publishing technologies/options, downsizing and deskilling and electronic literacy. Because this dissertation is a workplace study, one would usually expect to also find a review of workplace studies in this section; however, that literature can be found in

Chapter 2, since those resources are central to an explanation of the research methodology used in this study.

Electronic Publishing and Technical Communication

While the concept of the paperless office has been around nearly two decades, the field of electronic publishing has not received a great deal of attention in professional writing journals. However, since the late 1980s, many writers addressed the changing publishing media and the new role technical communicators have as a result of the new technologies. Several scholars, such as Shirk (1988), have pointed out that writers are becoming more like computer science specialists, as they begin to work with on-line tutorials and computer based training. Shirk believes that the influence of computer science has led to an increased stress on the use of graphics in documentation. In addition, she hopes that in the future, technical communicators not only follow the lead of computer science specialists, but also play a role in the development of the software applications that they help write user manuals for.

Haselkorn (1989) feels that that interactive role of technical writers is already upon us. He writes that the "online documentation specialist is now playing a role in all phases of product development, from initial design to final support" (357). He points out how online documentation is better than hardcopy because it can be "integrated more closely into the product life cycle" (358) and saves in space, printing and maintenance costs. He is writing in the early days of CD-ROM technology, of course; his words ring even more true today for companies such as the one being studied. With the growth of the WWW, a medium which has the potential to reduce distribution costs and especially the costs of

updates, the production cycle is greatly reduced and can be more closely tied in to the product development.

Also writing in the late 1980s, Treadwell (1988) likewise believes the role of technical communicators in this new environment is changing: "The new communication context implies a shift from technical communication as presentational skills to technical communication as a broader range of skills that includes communication policy analysis and the ability to forecast and evaluate public information requests" (267). Treadwell notes that the new communication technologies make the ability to handle customer queries for information much more important, and that technical writing education needs to gear its practicioners to not only be tactic-oriented but also strategy-oriented.

The wide variety of media available makes this strategy-based approach even more important. Martin (1995) argues that technical communicators often overexploit new media and sometimes use it inappropriately: "Just as we had to learn not to use all available fonts on one printed page, we now need to learn which media are appropriate for which message, and which ones are not" (97). The new technologies will also change people's roles he says, as writers will need to become good at "storyboarding" and editors will expand their role to include the editing of audio and video.

Similarly, Keyes, Sykes and Lewis (1988) saw the advent of electronic publishing systems bringing about a need to change document production processes. They note how the new technologies will lead to new concepts of design and thus the process of making those new layouts: "The arrival of electronic methods for developing and disseminating text-based materials has brought the need for fundamental changes in the process of

document design" (251). Naturally, when developing online-based materials, the change in design is even greater (Carlson 1988). Like Martin (1995), Horton (1991) cautions against using these online, hypertext help/documentation methods when they are not appropriate.

Zimmerman (1988) predicts that the changing nature of products, design and online help not only changes the role of technical writers and how documents are produced, it also has the potential to make technical writers obsolete. Part of this obsolescence is the result of creating products which are more intuitive and do not need much documentation. Another reason is that software developers are writing much of their own documentation. Like the software programmers at the company I am studying, Zimmerman looked at these developers who saw support and documentation as being part of their workload, in spite of having little or no training in technical writing.

Farkas & Poltrock (1995) note how the new technology affects not only writers, but also editors. They point out how new hardware and software allows workplace editors to edit other documents on-line. This ability translates into greater speed and efficiency when editing documents and allows for better version control. (It is interesting to note that the company being studied did move to a document control method when circulating electronic copies of its documents internally). The pair differentiate between types of ways of marking online text: silent editing, comments, edit trace. All of these methods have weaknesses, especially since they lack the ability to integrate traditional copy-editing symbols on electronic text.

The growth of electronic editing and publishing is just starting to change the technical writing curriculum, as Selber's survey of technical writing programs included but one class dedicated to electronic publishing, and that at his own Michigan Technological University, where students are taught the processes involved in planning, writing, designing and managing publications for print using electronic publishing systems (Selber, 1994). In the few years since that survey, the number of electronic publishing oriented classes has no doubt grown, however.

Another direction of some electronic publishing scholarship has been in the area of publication of scholarly works (Standera, 1985; Featheringham, 1981; Okerson, 1992). Several dissertations/theses in various fields (mainly computer science) have been written about electronic publishing, but they too have focused on scholarly publishing (Hanus, 1995), hypermedia design (Lai, 1994) or the technical intricacies of the distribution system (Baker, 1992).

Key in the discussion of electronic publishing is carefully defining what the term "electronic publishing" actually refers to. Sullivan (1992) creates a tripartite taxonomy of publishing media: print, on-line and projection. Print documents, while produced on the computer, are intended to be distributed on paper; on-line documents are hypermedia productions which cannot be reproduced on paper, and projection media are designed for presentations. More useful for this dissertation is Porter's (1994) distinction between electronic writing which is produced by a computer (but intended to be printed off) and writing which is distributed via computer (and usually intended to be viewed on-line). This latter category, which includes scholarly electronic journals, discussion groups and

hypertexts, is becoming the more standard meaning for electronic writing, according to Porter. For the purposes of the company being studied, those two definitions are blurred, however. While the electronic publishing is designed to be sent electronically to customers, most all of those customers will print out the documents they receive (Stetler, 1996b).

Kalmbach (1997) similarly notes how these definitions run into each other. He sees electronic publishing as a continuum. On one end of the continuum is document-based electronic publishing, which he sees as being self-contained documents, that is, documents which have "definable edges" (87). In this sense, both a memo to be printed off and a Hypercard stack with 20 cards would be self-contained and document based; under Porter's definition, these two types of documents would be fall into separate camps. On the other end of Kalmbach's continuum are distributed documents, virtual electronic documents which "do not have clearly defined physical boundaries. Instead, client software resides on the users' computer, constructing a virtual document by retrieving information from various servers on a network." The World Wide Web is the most obvious example of this type of electronic publishing. In the middle are mixed forms, such as email discussion groups and Hypercard and Adobe Acrobat files which contain hyperlinks to web sites.

Most helpful is Kalmbach's description of the evolution of publishing technologies, from print to electronic documents (p. 94):

Table 1.1 Kalmbach's Evolution of Publishing Technologies

Letterpress	Offset	Word Processing	DTP/ Doc-Based Elect. Pub	Disributed Electronic Pub.
Fixed Page Fixed text Fixed document	Virtual Page Fixed text Fixed document	Rigid Page Virtual text Fixed document	Virtual Page Virtual text Fixed document	Virtual Page Virtual Text Virtual document

Kalmbach's taxonomy mirrors the evolution and future plans of document production at the company. The company began by creating their own fixed documents using typewriters and typesetting, then moved to using word processing. Internally, a network system had been established to share documents electronically, especially between marketing and engineering. Plans were being made to distribute the company's documentation to customers online, but keeping this documentation in the same format as the printed version, essentially maintaining a "fixed document" and not using the web's interactive and linking capabilities to produce "virtual documents" that might better fit the needs of individual users.

Publishing Technologies

O'Malley (1993) outlines some of the various new electronic mediums, such as the Compact Disc, interactive video and the videodisc and notes how they are changing the communications industry. Many of these technologies were not originally intended for technical communication, but are now being adapted to fit its needs. The videocassette was originally first used for time-delayed broadcasts by the telecommunications industry, but now has much more widespread uses. The videodisc now allows for much more interaction that the videocassette, thus increasing retention in training sessions. Going digital is the way of the future, she says, noting that the typical CD-ROM can hold 650 megabytes of space, the equivalent of 250,000 pages of text. One can easily see the cost advantages of distributing large manuals on CD-ROM instead of paper. One computer software company reduced its duplication cost for publishing a manual from $572 to $15 by using CD-ROM technology (Tynan, 1993). The costs, of course, have continued to drop over the last several years; the cost of reproducing a CD-ROM, with three color printing on the disk in quantities of 10,000, is as low as 55 cents per disk (Spring 2000 Diskmakers Catalog).

The CD-ROM can also have many more interactive features and better navigational tools, such as searches (Martin, 1995). These same features are available on other media as well, such as Zip or Jaz disks, but these require drives which are not nearly as ubiquitous as the CD. One other media, DVD (digital video/versatile disk), was not available in the mid-1990s during this study. DVD players, which are becoming more commonplace (many new Apple and high-end Windows computers ship with DVD as

standard equipment) can read both CD-ROMs and DVD disks, which can hold more than a gigabyte of data.

In the early 1990s, many personal computers did not have CD-ROMs, and the floppy disk was a popular medium because of its widespread accessibility (Maunder, 1994), but was not as efficient for distributing large documents, which take multiple disks. Maunder explains how the use of floppies, CD-ROM and communication links (he compresses email, fax-back and the Internet into this one publishing category) has given rise to SGML, a language similar to HTML that can be read across platforms and programs.

The CD-ROM is viewed by many to be superior to the floppy disk, but the Internet is seen as superior to the CD-ROM in many ways (Hall and Carr, 1995). Maunder (1994) states that "The costliest task is the filing of updates to large manuals, often in the form of replacement manuals" (p. 52), and one can easily see how sending a disk or CD-ROM to update a page or two can be much more expensive than sending out paper copies. Martin (1995) also notes how the updates (Hall & Carr, 1995). Howard (1993) discusses how hypertext documents can be distributed across electronic networks, while Lindeborg (1993) describes one Internet publishing method, electronic mail, and how it helps document dissemination at a governmental agency. Many other articles are related to electronic publishing only tangentially, such as Haselkorn's (1989) discussion of on-line documentation as it relates to on-line help screens built into a computer program.

Increasingly, the World Wide Web in particular has been discussed as a electronic publishing medium, and was one option seriously explored by the company I am studying. The growth of the World Wide Web has made this medium a popular document distribution option for many companies. While only 130 web sites existed in June of 1993, over 100,000 sites were established by the beginning of 1996 and an estimated 230,000 sites were up by June of 1996 and 650,000 by December of 1996 (Gray, 1996). The number of individual documents on the Web reached over 60 million in October of 1996 (Lycos, 1996). With these figures, it is not surprising that companies are moving to publishing their documents on-line in order to serve their customers better (Maunder, 1994). Carliner (1998) notes that "Although organizations continue to use other platforms, most information delivery is converging on the Web" (15). The World Wide Web and other electronic distribution methods, such as ftp and fax-back servers, are changing the way companies produce and handle documents, and are radically affecting the role of the technical communicator and the field of professional communication in general. More and more, technical writers are preparing documents for World Wide Web publication (December 1996). A survey conducted by Silker and Gurak (1996) found that 41 percent of their survey respondents are at companies which use the Internet for on-line documentation, and nearly three quarters of those surveyed use the World Wide Web in their jobs.

These sources and web statistics are used to illustrate the popularity of the web and the feasibility of using the web as a means for document distribution at the time of the study. Since that time the Internet has become even more ubiquitous, growing at a

tremendous rate. A study by the NEC Research Institute estimated the existence of 320 million web pages in December of 1997. Today, the Google.com search engine alone purveys 1,387,529,000 web pages (2001). There are over 36 million domain names registered, with over 22 million of those having a .com suffix (DomainStats.com 2001). Beason (1996) discusses how producing documents for the WWW challenges writers to adapt their writing and collaborating models in order to successfully compose documents for the Web. He found that publishing on the web forced writers to redefine tools, the production processes, and the very concept of a document. Especially pertinent to this dissertation is his description of the constraints of producing both print and online versions of the same document. His writing group wrestled with the problems of translating print versions of documents in Framemaker to HTML and the future malleability of the online version versus the static printed book.

Hunt (1996) also discusses the problem of translating documents to the Web, pointing out how many companies, especially in the early days of the Web, "merely placed their electronic versions of print materials--marketing brochures, catalogs, technical reports--online without giving much thought to how the Web might differ from traditional, print-based delivery systems" (376). He describes the importance of not only altering documents to fit the medium, but also creating an individual and communal ethos in establishing a Web presence.

A web presence can be very important for corporate communication, but there are disadvantages, as well as advantages. (Ritzenhaler and Ostroff , 1996, Teague, 1995). Teague (1995) argues that the Web is an important tool for marketing communicators, but

that security and access for everyone--especially those outside the U.S.--are key problems. However, the comparatively low cost and ability to reach a wider market are important advantages to the Web, in addition to its interactive capabilities (Teague, 1995).

Other technologies besides the Web also have an effect on electronic publishing. James (1988) discusses how artificial intelligence technologies such as optical character recognition and online retrieval are automating the production and distribution of text. James breaks down object recognition effects into four areas which relate to electronic publishing: optical character recognition, vectorization (scanning images into editable files), declarative formatting (using templates) and online retrieval. In my study I will briefly discuss how OCR technology would have been crucial if a fax-back method of production was used, and how a scanner was used to bypass the expensive photographing process.

Brockman (1988) fears that some of this new technology will have a negative impact on technical communicators and technical communication. He is especially concerned that the capabilities of programs like Aldus (now Adobe) Pagemaker be counterproductive in that they will allow graphic novices to do page layouts. He questions "how to prevent this new publishing methodology from impoverishing the rhetorical appropriateness of graphics" (27). The use of declarative formatting mentioned above with James also ties in, because companies often use electronic templates to create a consistent corporate image--at the cost of choosing graphics and layouts which are most appropriate to the document. Following from this is the concern that the overuse of templates will result in a deskilling of technical communicators.

Downsizing and deskilling

Implicit in Brockman's critique is the worry that the deskilling will result in promoting unqualified personnel (he mentions keyboard operators) to documentation positions, a concern echoed by Keyes, Sykes and Lewis (1988). In the 1990s, an era of downsizing, it is not so much a matter of promoting unqualified personnel, but of laying off technical communicators and adding documentation duties to the list of job tasks for managers or clerical workers without backgrounds in professional writing. This was clearly the case at the company I am studying, where downsizing led to engineers, managers and administrative assistants creating documents previously produced by a technical writer and graphic designer.

In exploring this deskilling, I rely on both Zuboff and Marx's (through the view of Feenberg) notions of the deskilling of the workplace. Marx looks at deskilling from the standpoint of the worker who is no longer a craftsman, but an assembly-line minion doing brainless, repetitive work. Zuboff extends this notion of "craft deskilling" (Feenberg 136) to the late 20th Century workplace, showing how in some settings the technology replaces the information and skills of workers . My study focuses on the deskilling of the writing/graphic design work in the company and how the absence of a graphic artist and technical writer changes the job duties of the remaining employees and how documents get created and distributed.

With the advances in printing and in graphical layout programs like PageMaker and the increased graphical capabilities of Word, even a novice user can easily and quickly create graphical layouts which design experts only a decade ago would have struggled

with. These capabilities made it possible for the company to lay off its graphical designer. Product schedules which were originally done by the graphic designer were now being done by engineers or product managers in Word. The same was done at various times in the company with writing. Based on personnel and finances, oftentimes the company let its technical writer position go and required the engineers to write technical manuals. In both cases, downsizing and technology led to the deskilling of these duties; no longer were they crafts to be done by experts, but jobs which could be done by any number of people within the company. Of course, this approach taken by the company either ignores the fact that this deskilling cannot replace the action-oriented skills described by Niesser and Zuboff in *In the Age of the Smart Machine* (p. 186-88). The knowledge and experience in design possessed by the graphics manager and a technical writer cannot be replaced by technology or mere step-by-step instructions. And, the various skills involved in desktop publishing require extensive training (Sullivan, 1988), training that the company did not provide.

In some cases, however, these changes in the workplace have led to an empowerment of certain employees. Zuboff talks about the belief that jobs at Consolidated Underwriters would improve as a result of adding informating technology (159) and that the clerical jobs at companies like Global Bank Brazil would reach "quasi-professional" status as a result of the new technology and decision-making. The same is true to some extent at the company studied in this research project; less than six months after the graphics designer was laid off, the secretary/administrative assistant asked for my help in learning PageMaker in order to do the tasks the graphic designer would have

done. These new computer roles parallel those found by Dautermann (1996): "Sometimes electronic environments can offer ways in which the traditional writing roles in a company are extended or altered...Computers sometimes extended the involvement of clerical personnel into such work as page design, report generation from databases, and database management for mailing lists or client records" (p. 13-14). This new use of technology has thus made the remaining employees more "malleable," a requirement in the technological age. Heidegger writes that the technological advancements require "fitness of the laborer for varied work, consequently the greatest possible development of his varied aptitudes" (qtd in Feenberg). In some ways, these workers are being given advanced responsibilities and are put in managerial-level roles (Scott, 1996).

This study also compares the electronic publishing decisions in light of Zuboff's other theoretical approaches. In addition to some of the informating capabilities described above, technology is most often used in terms of its automating potential, Zuboff notes. That automating capability in an electronic distribution method like the World Wide Web largely replaces the duties of people in positions such as Literature Coordinator, a job in existence at the company until 1994. With customers being able to retrieve documents at will from a Web page, there is little need for a person to respond to documentation requests.

The documents published electronically are examined using Zuboff's automating and informating distinction. As noted earlier, the company had been planning to just transfer its paper documents online. In doing so, it has been only been altering its documents slightly presentation of material, as some companies such as Ameritech

(Wieringa et al, 1996) have done. This automating use of the technology--the hypertext World Wide Web--does not take advantage of the informating capabilities of hypertexts, as described by Johnson-Eilola and Selber (1996). Johnson-Eilola and Selber argue that the use of hypertexts can be used more for automating purposes by shifting the focus from people to machines and thus "follows in the footsteps of other de-skilling technologies that were used by managers to translate operator knowledge into computers in order to exercise more complete control over information products and processes" (130). But, hypertext has great informating potential because it can "expand communication processes" (124) and because it allows readers control in navigating through text themselves in order to find information.

As mentioned before, tied in with the deskilling is downsizing, which was a popular topic in the media and journals in the mid 1990s, although it has received much more attention in business journals than in technical writing publications. Many in business, such as Beam and Pines (1992), Moravec (1994), Cameron (1994) and Freeman (1994) focus on methods for effective downsizing, and a few have written about the electric utility industry (Cross, 1993; Rich, 1993) in particular, although again, nothing is said about technical writing in these pieces. A large number of articles are also devoted to the pitfalls of downsizing, how downsizing has actually increased employer costs in many instances (Markels & Murray 1996; Corporations, 1991; Greengard, 1993; Filipowski, 1993). Loss of innovation (Unthinking, 1995) and employee experience (Edmonston, 1994) are also lamented, as is hampered TQM and customer service (Niven, 1993; Powell, 1994; and Miller, 1993). The problem of a decline in customer service has

already been noted by members of the company being studied (Martin, 1996c; Miller, 1996), as has the problem of an exodus of survivors of layoffs (Miller, 1996), a problem also discussed in the literature (Mone, 1994; Newman, 1992; Ford & Perrewe, 1993). While there are also many articles and dissertations which are centered on downsizing, there is very little literature on how that downsizing has impacted the document production and distribution at a company. Horton (1993) predicts that "we will enter the new century with far fewer publications departments," (p. 27) a statement which is definitely true of the company being studied. He contends that companies will downsize technical communicators who produce large manuals. In order for technical communicators to succeed, they must improve their skills in helping design products which do not need manuals.

Echoing Horton, Steve and Bigelow (1993) write that "One precedent for scrutinizing W/E [writing and editing] groups as possible candidates for downsizing is the recent treatment of in-house print shops. Some organizations have dismissed their print shop staff and either lease the latest technology in copier equipment or use a vendor for all reproduction needs" (p. 21). They note that the ousted publications department personnel sometimes purchase their equipment and bid on outsourced jobs, which is also the case at the company I am studying. In that same issue, Smudde (1993) notes how the downsizing can actually result in raised costs because of a need for hiring consultants to do the work previously done by full-time personnel, which has been the case with the former Graphics Manager at the company. Smudde also points out how technical writers are essential in helping maintain a good corporate image, and he explains downsizing can

also kill the morale of the workers who remain, since they might fear their own jobs will soon be lost. The exodus of two engineers and a top notch software programmer from the company being studied is evidence that this has indeed been a significant problem.

Barchilon (1993) points out that companies have been moving to replace full time with temporary personnel, which is the case with the outsourcing and the hired technical writing consultant at the company being studied. Barchilon points out how the attendance at STC conferences dropped 25%, possibly as a result of downsizing, and that the number of people submitting articles has also dropped, because the technical communicators were too busy to submit articles because they had to assume duties previously assigned to downsized staff.

The economic costs of producing and distributing documentation--and the costs associated with not writing and sending out good documentation--is a related topic discussed in technical communication journals. Cover, Cooke and Hunt (1995) detail the costs involved in producing a document at their company and point out the problem with technical support calls and lost sales which result from insufficient or poorly written manuals. Barchilon (1991) also details this cost: "Good documentation can lower corporate costs by reducing the time that the staff spends answering users' questions. Conversely, poor documents can hurt a product" (p. ET 97). Customer support is a significant problem at the company which is the subject of my ethnography; managers have commented on the vicious circle created by poorly written manuals: the product support people spend so much time on the phone with customers having problems that

they do not have the time to write good manuals which could decrease the need for customers to call in.

Kirsch (1988) looks at two companies, comparing the costs of producing manuals and the environment which causes the two different cost-structures and views of documentation. The company which did not value manuals and documentation and did not hire experts to produce these documents had much lower editing costs than the company with experience in producing documents, but that this meant only one draft of many documents was produced, and the revising and usability testing--key factors in improving documentation and reducing support costs--were not done due to costs involved, or more likely, a lack of understanding of the value of revising.

Final costs and benefits of effective documentation are vital for Redish and Ramey (1993), who seek to quantify the value technical writers add to the workplace. In order to prevent the downsizing of their jobs, the pair suggest that technical communicators need to show how money put into technical communication is an investment. The return on that investment can be shown through decreased costs for support, translation and training, and increased revenue through higher sales, better customer satisfaction and greater productivity. They recommend using usability tests on products and documentation and multiplying time costs by the number of users.

Of course, when there are no technical communicators at the company, the chance of finding someone ready and willing to argue for the importance of good documentation is greatly reduced. When a company downsizes its technical communication staff, it takes

away the loudest voice for the customers and the importance of good, clear communication and documentation.

Technological Literacy

Finally, this dissertation looks at the situation, the site and the customers in light of theories and research about literacy. Recently, several articles and books have been written in composition studies which address the importance of computer literacy. It is the issue of computer literacy which lies at the center of the company's inability to implement a electronic publishing system and what could have led to the failure of such a system had the company ever acted on their initial goal of distributing documents electronically.

The perceived importance of electronic literacy issues has been shared by many people in our field, as evidenced by recent publications. Myron Tuman (1992) wrote *Word perfect: Literacy in the Computer Age* and edited a 1990 work on literacy issues. Selfe, in addition to her aforementioned article, co-edited a 1994 collection with Susan Hilligoss, *Literacy and Computers: The Complications of Teaching and Learning with Technology.* More recently, the issue has been addressed in nonacademic settings in Sullivan and Dautermann's 1996 edited collection, *Electronic Literacies in the Workplace: Technologies of Writing.* According to Selfe (1990) and others, technology has forced us to expand our definition of literacy. We must now account for the ability to work with the computer screen, and not just the printed page. Key to this study is the understanding that both readers and writers are affected in this changed view of literacy, as computer

technologies affect not only how we produce texts, but also how we read texts. In fact, the very definition of texts is changing. No longer is text just words on a page, but also it can include graphics, Selfe writes nearly a decade ago. Now, of course, that definition has been further expanded to include sound and video, and the birth and expansion of the web in the last five years has had an enormous effect on the growth of hypertext, a yet further challenge to traditional conceptions of reading and writing literacy. Slatin (1990) and Johnson-Eilola (1994) point out how the nature of reading changes in the new world of hypertext and how new reading strategies are needed and how our concept of literacy must change. In addition to hypertext, the ability to work with data has also been expanding our notion of reading and writing (Mirel, 1996). E-mail has also brought with it a new rhetoric and set of conventions and literacy concerns (Selfe 1994), especially given the ubiquitous nature of email in the workplace.

In her most recent work on the subject, *Technology and Literacy in the Twenty-First Century* (1999), Selfe argues that this new thrust to achieve technological literacy has yielded mixed results. To begin with, the emphasis on technical literacy has reinforced our tendency to look at the world "as a series of problems that are amendable to technological fixes" (140). Indeed, that is exactly what seemed to happen at the company being studied: they saw a problem and immediately sought a technological solution. This situation is also discussed later in the theoretical framework section of this chapter, as is a similar obstacle outlined by Feenberg: the lack of power of the technological illiterate. Selfe writes, "the people described as illiterate in connection with technology are those with the least power to effect a change in this system" (139). This lack of power is a

significant part of the problem with the movement to infuse technological education into the curriculum: the children who are poor and in rural and inner-city schools—and are thus typically minority students—are less likely to receive any technological instruction. Already disadvantaged, these students are yet further handicapped by their technological illiteracy in an age when their counterparts in more wealthy schools and families are very literate.

Before going further, a definition of technological literacy is in order. For one definition, Selfe cites the federal government's *Getting America's Students Ready for the Twenty-First Century*: [Technological literacy involves] computer skills and the ability to use computers and other technology to improve learning, productivity, and performance" (10). She notes how that definition is too narrow, and seeks to add another aspect: the "social and cultural contexts for discourse and communication, as well as the social and linguistic products and practices of communication and the ways in which electronic communication environments have become essential parts of our cultural understanding of what it means to be literate (11). In other words, to not only be proficient in computer skills, but to have an understanding of how the technology operates in our communication and our culture. Using this second, richer definition illustrates one of the problems the company encountered, the lack of comprehension about the social and communicative impacts of imposing an electronic publishing system upon a customer base that was not prepared for this technological move. The readers of the technical manuals--primarily meter shop personnel--may not even have a high school education, and occasionally may not have good traditional print literacy. As such, they may be more poorly equipped to

handle the transition to electronic literacy that electronic publishing would have mandated. This problem will be discussed in much greater detail in later chapters.

Access to the technology, another issue raised by Selfe (1990, 1999), was also a challenge for the readers of the text. While the inclusion of graphics in the text would not be unusual for the audience, sound, video and especially hypertext would create usage and navigational problems for many first-time users of the new electronic catalogs and technical manuals. Clearly, any move to electronic publishing with an audience which was not literate in the new reading patterns associated with the technology would be done at the peril of the company.

Many of the early decisions made by the company regarding electronic publishing reflect both a lack of understanding about computer literacy and a lack of electronic literacy itself on the managers' parts. Until near the end of the study, the marketing director--one of the main people in charge of making decisions about electronic publishing--did not have Internet access or a CD-ROM drive. After the company executives laid off the graphics manager, they had no one left who knew anything about publishing, let alone electronic publishing. This layoff also affected document production; no one at the company knew how to use page layout software, which forced the company to rely on Microsoft Word and the work of consultants.

THEORETICAL FRAMEWORKS FOR THE STUDY

To begin with, the study will examine the view of technology that the company embraces. In doing so, I will rely primarily on Feenberg's work in Critical Theory of Technology. First of all, it must be understood that the bulk of Feenberg's treatises address the effect of technology on society as a whole, on a country or group of countries which subscribe to a certain economic philosophy. But, while his writings may focus on large groups such as Leninist Russia, Western capitalist countries or communist Yugoslavia and China, his theory can also be adapted to smaller subcultures, such as an industry within a country. Some of the overarching political forces are not at the fore in such subcultures, of course, but the larger group's social, economic and political norms and approaches to technology are borne out in those subcultures and these subcultures serve to provide examples and better illustrate the general principles which Feenberg elaborates on in *Critical Theory of Technology*. This more micro-level approach is also in keeping with Feenberg's later works, as he himself applies his principles to more specific, smaller settings, such as the FDA and AIDS patients and with France and the information superhighway, which he discusses in *Alternative Modernity*. Feenberg also sanctions applying his principles on a smaller scale when he discusses "technical micropolitics," which are smaller environments which involve "forms of concrete political protest that aim to transform particular technologies or technical systems through pressure from users, clients, or victims" (1995, 38). This transfer from large cultures to smaller spheres works surprisingly well.

With that in mind, I am taking Feenberg's theory and applying it to the subculture of the electric meter industry, concentrating on one company within that industry. In analyzing this subculture, I will be looking at all of the groups of people involved—the capitalist owners, the managers, the technological elite, the company's workers, the distributors, the utility customers and the workers installing, using and maintaining the products. Through this examination I will show how not following a critical theory of technology had damaging consequences to all involved. Feenberg notes in his preface, "The design of technology is thus an ontological decision fraught with political consequences. The exclusion of the vast majority from participation in this decision is the underlying cause of many of our problems." (p. 3). Indeed, there were many problems at this company which were caused by not including even close to a simple majority in the decision-making process.

Before launching into an explanation of Feenberg's critical theory of technology, an explanation of his overall agenda is in order. It is an agenda which he makes explicit in the first paragraph of his book, but one which cannot be fully understood until the end. He notes in the beginning that "My theme is the possibility of a truly radical reform of industrial society" (3). This radical reform is the move to socialism, which he clarifies in his introduction to *Technology and the Politics of Knowledge* (1995) as extending democracy "from the political domain to the world of work" (3). He wants to change the hierarchical, often autocratic workplace and give the worker more of a voice. Technology and the control, implementation, and accommodation of technology is the key to democratizing the workplace, he contends.

Technology can only be a factor, of course, if we believe that the path of technology can be changed. If we hold a deterministic view as a premise—that technology's path of development is pre-determined—then we cannot subscribe to the rest of Feenberg's argument that technology can be a locus of change from capitalism to socialism.

So, Feenberg's first move is to show the validity of his premise, that the common and deterministic views of technology--*instrumentalist* and *substantive*--are faulty. The first view, instrumentalism, sees technology as value-free tools which can be used across environments and cultures with similar effects. In this framework, technology is indifferent to political and societal factors; it is neutral. There are four main tenets of this instrumentalist approach (p. 6):

1) Technology is "indifferent to the variety of ends it can be employed to achieve."

2) Technology is indifferent to politics. "A hammer is a hammer," no matter what civilization it is put in.

3) Technology is neutral, a result of its "rational" and scientific nature.

4) The effect of the technology can be measured using the same standards, regardless of the cultures it is used in.

Essentially, this means that technology is simply a tool, independent of the society it is placed in. Feenberg explains that people believing in the instrumentalist view feel that technology is not like "legal or religious institutions" which cannot be transplanted elsewhere; rather when it comes to technology, "what works in one society can be expected to work just as well in another" (6). As such, technology can be transplanted across cultures. A computer software package used in an industry in Britain would be

able to be utilized in India and could be expected to yield similar effects. Or, in the case of the company being studied, a web publishing technology used in another industry or another company could be transplanted to the electric meter industry easily because the technology is indifferent to the political and cultural milieu.

This philosophy is not uncommon, especially in business. If management sees how a new technology, increased productivity 17 percent at one company, they often try to transplant that technology to their own firm, expecting similar results—even though the mindset and experience of their employees is radically different. For management personnel who subscribe to this philosophy—as many do—and who place great emphasis on the bottom line—as most all do—the only logical position is to use technology which increases efficiency, profit, etc. On a cultural scale, one can see how this instrumentalist position is deterministic: given society's rationalism, which accepts the importance of efficiency and profit, our culture will almost always accept the new technology to increase efficiency and profit. One can clearly observe this in many modernizing Third World countries which see no other choice than to implement Western technologies—and the accompanying division of labor and other authoritarian workplace hegemonies—in their struggle to become players in the global economy.

This belief system matches the philosophy of the company being studied very well. As I will explain in greater detail later in the dissertation, the company executives initially took the stance that the electronic publishing methods which worked well for other companies and in other industries would work well for them. If distributing a manual over the World Wide Web works for X computer firm and its customers, then it

should work for our company, they might have reasoned. The treatment of technology as simply a tool is also found in their choice to not only lay off the graphics manager but to sell his computer, scanner and page layout software was a decision to reverse the path technology was taking--implying that technology is a tool which can be taken away and is not an irreversible cultural force. This same view of technology as a tool led to a decision to repurchase that same software (an updated version of PageMaker) two years later, even though they did not have any employees who knew how to use that tool and who had the graphics arts and page design skill and experience to use that tool well. I will explain this scenario in greater depth in Chapter 3.

The invalidity of the instrumentalist position is easily illustrated by what I refer to as an "ice pick is not an ice pick" view. If you give an ice pick to a 1950s servant, he or she will use it to chop up a brick of ice. If you give it to a 1800s Plains Indian squaw, she might use it for leatherworking, not even thinking about the use for ice. Give it to a pre-Iron Age native, and he might use it as a weapon. In short, a tool is tied closely to the culture in which it is introduced. Many societal factors will influence how a tool is used, or whether it gets used at all.

The second approach, the *substantive* theory, sees technology as a culture-changing force which overrides other values previously present. Technology in itself becomes a type of cultural system, a system which shapes our society. It is, "thus a destiny from which there is no escape other than retreat" (p. 6). Technology is not a tool, as it is for the instrumentalists, but it is a way of life.

These first two theories parallel two outlooks described by Haas and Neuwirth (1994): technology is transparent and technology is all-powerful. Haas and Neuwirth argue that these myths--along with the philosophy that "computers are not our job"--have hindered research in writing and computers.

While the instrumentalist and substantive theories of technology seem to be diametrically opposed, Feenberg shows how they share similarities, especially in their "take it or leave it" approach to technology He notes that "in neither case can we change it: in both theories, *technology is destiny*" (8). And, since no culture has chosen to eschew technology on a grand scale, we are left with a deterministic position, one in which technology leads us down a path from which we cannot waver. My analogy: we can either choose not to mount the bucking bronco of technology, or, as every culture does, we can choose to ride that bronco, letting it buck us where it may while we hold on and try to adapt to its movements.

In place of these two theories, Feenberg proposes a third view of technology, a critical view. This third approach promotes seeing technology as a culturally-inscribed element which can be used by those with power to effect societal change according to what is advantageous to them personally or to the society. A Critical Theory involves a more complex relationship between technology and society, one in which there is a dialectic and an opportunity to *change the course* of technological forces. This theory recognizes the influence of the dominant classes on the use of the technology and thus opens the door for a critique of the technology which can lead to a more democratic potential for the technology.

RESEARCH QUESTIONS

Theory of Technology

This analysis of the different philosophies toward technology leads to the first research question:

Research Question #1

What theory of technology did the company management take? Did they take an instrumental, substantive, or critical approach to the technology they introduced into the company?

--What decisions illustrated this theoretical approach?

--What were the ramifications of taking this approach for the company, the workers and the customers?

The introduction of the influence of power and the possibility for change is very interesting, especially when taken out of the context of a country/society and placed in a much smaller setting like a company, in which the opportunity for certain individuals or groups to determine the role of technology is greater. Central to this determination is who has the power. One could say that the company has the power, and especially the executives at that company have the power to make technological changes. In light of this study of document production and distribution, it is also conceivable that a knowledgeable technical communicator who works diligently in drafting and presenting proposals could have the most influence in the decision to use a certain electronic document distribution method. At the same time, it may be the customers who have the

real power. By rejecting that vendor company's means of distributing its documentation and not buying from that company, the customers may in the end be the ones who shape what technology will be used and the ways in which the technology is used.

Back to the concept of technological determinism: Feenberg's critical theory of technology, in providing an avenue of change, lays down a base for his main argument: through changing the control of technology and the technical codes to be more worker-centered, we can move toward socialism, toward democratizing the workplace. Elucidating this transition to socialism lies at the heart of Feenberg's book. Feenberg, who stands on the shoulders of Marx in much of his writing, noted that Marx's ambiguity concerning this transition is the German philosopher's main weakness. In other words, Marx does not clearly explain how a society would be able to move from late capitalism, in which an authoritarian workplace was seemingly necessary, to socialism. Feenberg contends that this oversight can be rectified by examining the role of technology and the relationship between 1) technology and the ownership/management/state; 2) the technical elite and the worker; 3) the user/customer and 4) the culture.

Technology and Ownership/Management

In a capitalist society, it is the dynamic between the owners and the technology which is most easy to discern. The owners, of course, own the technology, the means of production. They can largely dictate what technology is introduced, how that technology is introduced and who is affected by the technology. And, consciously and subconsciously, the owners imprint themselves on the technology: "The values and

interests of ruling classes and elites are installed in the very design of rational procedures and machines even before these are assigned a goal" (14). One of those values, of course, relates to power. The owners/managers choose to use technology in a way which furthers their control over the workers. Feenberg borrows the concept of "management ideology" from Noble, fitting since in today's capitalism, owners have handed over their power over to management (owners are no longer the Carnegies or Rockefellers, but often large conglomerates or shareholders, who necessarily relegate operations to upper management). Noble's management ideology "orients development toward the technical alternative that promises to enhance managerial power regardless of its social consequences and even despite significant economic liabilities" (35). Feenberg, while reluctant to acknowledge the sacrifice of efficiency and profit for power, uses Noble to show how technology is used—or abused—to maintain the current power structure. Feenberg believes that the management will be careful not to introduce technologies which can undermine their authority.

One can easily see, too, how the current use of technology promotes an authoritarian workplace. The modern assembly line clearly establishes a hierarchical division of labor in which management lords over supervisors who lord over the deskilled line workers, who become mere "appendages of the machine." The fact that this organizational structure makes perfect sense and that we can think of no immediate alternative to this organizational pattern and implementation of technology demonstrates how deeply rooted the capitalist values are entrenched in present day America.

The control of the technology helps further the capitalists' "operational autonomy." According to Feenberg, "Operational autonomy is the power to make strategic choices among alternative rationalizations without regard for either customary practice, workers' preferences , or the impact of decisions on their households. Whatever other goals capitalists pursue, all viable strategies implemented from their peculiar position in the social system must reproduce their operational autonomy. The "metagoal" of preserving and enlarging autonomy is gradually incorporated into the standard procedures and ways of doing things, prejudging the solution to every practical problem in terms of typical responses. In industrial societies, strategies of domination consist primarily in embedding these constancies in technical procedures, standards and artifacts in order to establish a framework in which day to day technical activity is also activity in the interests of capital" (79).

Research Question #2

How was technology at the company used to further the power of the owners/management?

--Who was making the decisions?

--What technology was introduced to further this power?

--How was the implementation of this technology a reflection of the power structure?

Inherent in the above discussion of technology and the very concept of a critical theory of technology is the assumption that there is a choice when it comes to designing

and implementing technology. Feenberg's contention is that in making these choices to use technology in a way which furthers the existing power structure, there are many other possibilities which are tossed to the side, possibilities which could have represented the needs and values of the worker and consumer—and which thus could have led to greater efficiency and/or profit as well.

Research Question #3

What other technical options were available for distributing documents to the customers?

--Concerning the web-based option, the one most favored, what implementation changes could have involved the workers and customers more?

What other technical options were available for producing the documents?

--Specifically, what page design program was used (Word vs Pagemaker vs other programs) before and after the layoffs and by whom and why?

Who made the technology decisions concerning web publishing and page design programs and why did they make the decisions they did?

Technology and the Worker/Technical Elite

The owners and management elite, while they do retain their authority in a capitalist industrial state, do not possess total control, however. Some of the power rests with the "technical elite," who are generally one rung below the management elite. The term "technical elite," taken directly from Feenberg, describes the personnel who are positioned above the typical line worker but still under the control of the owner/management. It is this group that I will focus on when referring to the relationship

between the worker and technology. The worker in Marx's sense is the person who works on the assembly line or some such mechanistic form of production. But, in terms of the technology I am concentrating on, the technology of document production and distribution, there is no true "worker" in that sense, except perhaps the literature coordinator who was primarily a clerical person sending out documents. The main power structure at this company is a hierarchy which begins with upper management and proceeds through the technical elite down to the customer, the lowest rung on the chain. The technical elite in this case consists of electrical and mechanical engineers (who help in producing documents and in fielding support calls), a graphic designer and a technical writer. These people are subservient to the owner/management group, consisting primarily of the Plant Manager (Vice-President) and the Marketing Manager.

In Feenberg's theory, the role of the technical elite is critical in the transition to socialism. Again, Feenberg builds off Marx and also off of Lenin, who attempted to implement Marx's ideas in Soviet Russia. Feenberg quotes Lenin's *The State and Revolution*: "The question of control and accounting should not be confused with the question of the scientifically trained staff of engineers, agronomists and so on [the technical elite]. These gentlemen are working today in obedience to the wishes of the capitalists, and will work even better tomorrow in obedience to the wishes of the armed workers. " (51)

So, while the workers, in revolting against the rich, may be able to eliminate capitalist ownership of industry and be able to handle the accounting and managing of a factory, it is clear that they cannot simply replace the people with technical skill. These people have

specialized knowledge and skills which require years to acquire. Ironically, in this passage Lenin seems to treat these people as tools and as pawns (who will act in "obedience" to workers)—and as people lower than the worker on the totem pole once the workers unite and throw off the yoke of capitalist ownership.

The role of the technical elite is more complex than is illustrated in Lenin's quote, however, for the technical elite are also involved in the power structure. Feenberg, in delineating a theory of "technical politics," points out that "political and technical issues are inextricably intermingled" (59). This intermingling is clear from the perspective of the management/ownership, in which technology can be used to confirm an existing power structure. But, it is also true for the technical elite, who because of their expertise in technology, exert power. Both Engels and Lenin recognized this. Engels saw evidence that in some situations, as Feenberg puts it, "technical personnel are responsible not only for their own post in the division of labor, but also for the unity and purpose of the whole enterprise" (58). Lenin likewise understood "the tendency of experts to extend their power beyond their specialty" (58). These observations, recorded long before the technical progress made in the last half of the 20th Century, resonate today, as we can see in our own experiences many specific examples of how technical experts wield power beyond their specialized technical domain.

It is in specific examples where we can see how this power plays out, and how in some ways the power of the technical elite surpasses that of the ownership/management. Take, for instance, the assembly line, a quintessential representation of the capitalist use of technology for efficiency, and a division of labor which reproduces a hierarchical power

structure. It is an example which Feenberg uses quite often to illustrate the power of the ownership/management—and an example he could have used to show the burgeoning power of the technical elite (TE) since the days of Marx and Lenin. Indeed, while the assembly is a tool used by the capitalists to deskill the workers and gain control over the production process, the decision of how/when/to what extent/by whom to use an assembly line is either made by the TE or it is made based upon the advice of TE. The decision to implement an assembly line must be based upon several factors: the availability of the technology, the price of the technology and the materials, the amount of workers that will be displaced, the cost of phasing out those workers, the cost of training workers to use the new technology, the amount of space involved, etc. In the end, a very detailed and complex cost-benefit analysis must be conducted before the first bit of technology is chosen. But, who writes up these reports in this age of late capitalism? Not the proletariat line worker, who usually does not have the expertise and who is not given such power. Not the owners, who have neither the time or expertise to undertake such analysis. Without a technical elite with the knowledge of the various technical options and the ramifications of using each option, the capitalist is left unable to make a rational choice about using technology.

Inherent in the above explanation lies the rhetorical power of the TE. In making estimates, in deciding what information to include and in choosing ways and means of conveying that information, the TE has decisions to make, rhetorical decisions which impact the choices the owners will make. The TE can choose to omit or leave in key information. They can simply "fudge" a few numbers here and there or use different

means of arriving at the numbers they might prefer to see. And, the TE can present the data in such a way that one choice—be it the best choice or not—is privileged over the other choices, so much so that the owner is strongly led to embrace that choice as well. The logos of their arguments, combined with the ethos of the TE's stance as an expert, can be very persuasive. In short, a respected and strong-willed TE can exert great influence on technological choices.

That is not to say that the owners are obtuse or mere puppets of the TE, of course. My point is that both Marx and Feenberg do not fully account for the important role of this group, which is an especially damaging oversight in the last half of the 20th Century. In the mid-nineteenth century when Marx was writing much of his work, the technology was less complex and there was more of a divide between capitalists and workers and fewer layers between them. Today, there is more blurring of roles, a larger middle group of technological elites and a society in which technology is becoming more and more important and prevalent. The growth of technology has meant the growth of the power of the TE.

Not to be overlooked, too, is the power of the TE to make decisions to further their own power and profit. They often have a strong vested interest in the outcomes of the implementation of any new technology. One technological choice may make their expertise obsolete and may put them out of a job. Another technology may privilege their particular skill set and vault them into the upper echelon of management. Needless to say, the impact of a new technology on the technical elite will have a significant effect upon

how the TE represent that technology to the capitalists and how any such technology is implemented.

The question becomes whether the TE use their power for the good of themselves, or the capitalist or the worker. If, within any organization or culture, this powerful TE is aligned with the capitalists, they will act to further the hegemonic interests of those capitalists and reduce the role of those beneath them in the introduction of new technologies. They can help shape the technology to promote a more authoritarian workplace. On the other hand, a TE which is aligned with the workers and/or the customers could be *the most powerful force in achieving Feenberg's goal of a culture which achieves consensus and adapts the technology to fit the needs of that culture*. While the capitalists or upper-level bureaucrats may make the choice to introduce a certain technology, the TE can, through the more micro-level decisions about implementation, allow for flexibility/looseness, or "play," for there to be areas which can be accommodated or changed to fit other purposes. Likewise, they can make implementation decisions which reduce the level of technological impact and deskilling upon the workers.

The influence of the TE is borne out in the French videotex, which Feenberg devotes a chapter to in *Alternative Modernity*. In "From Information to Communication," he notes that "Designers, purchasers and users all play a role in the process by which the meaning of a new technology is finally fixed" (156). (Note how he doesn't even mention the capitalists here, who he stressed in his earlier work have controlled the implementation of technology). The videotex—a 1980s computer device which began as a means for accessing databases but evolved into an email/bulletin boards/CMC medium--was a good

example of how designers and users were both instrumental in determining the way a technology was used. To begin with, the designers "carefully considered the 'social factors' as well as the human factors involved in persuading millions of ordinary people to admit a terminal into their home" (161). They made the product very easy to use and linked it closely with a technology the French were already comfortable with: the telephone. While the government-sponsored outfit had planned for the people to use the Teletel (the name of the French videotex system) for getting information from designated host sources, "hackers" were able to modify the system, allowing for hosts to be messaging systems. This type of use of the system took off, and soon sending messages, especially risqué ones, became the predominant use of the technology. Feenberg uses this example to show the power of the people in altering the use of a technology, but in many ways it is a better illustration of the power of the TE. First, the TE built the capabilities of CMC into the device to begin with. Second, the "hackers," which Feenberg equates with "the people" or "the users," in many ways are the technical elite: they had very specialized knowledge and skills. They were TE working outside of the company. Lastly, the technical elite in the Teletel system could have designed means to stop the hackers' changes and prevent future hacking, but instead they made changes which helped the CMC usage flourish.

All of this is not to say that Feenberg did not fathom the potential power of the TE. He recognized this power and saw how that power, when aligned with the worker, can be very helpful for the workers' cause. As a result of this power, Feenberg sees the positive influence of the technical elite as a necessary element in the move away from capitalism

and the existing technical codes which are rife with capitalistic values. He writes, "A transition to socialism can come out of an alliance of professional and technical elites with the underlying population to revise technical codes...Such an alliance could address the contradiction between participation and expertise and create a new type of industrial society" (139).

Of course, this alliance, which would lead to greater worker control, would come at a price to the managerial and technical elite. They would have to relinquish some power, according to Feenberg. Where would this desire to give up power come from? Out of a "culture of responsibility," out of the ethical desire to rectify an oppressive power structure. Such a transfer of power cannot occur overnight, as the mistakes of early Soviet Russia illustrate, but rather over a lengthy period of time in which those in power give the workers more and more room to negotiate means of gaining influence (Feenberg calls this a "margin of maneuver"):

"Whatever the legal structure of enterprise, the socialist workforce must rely on highly trained professional and managerial personnel for a prolonged period, not doubt measured in generations rather than years or decades....To go beyond these limits, managers' authority must be accommodated to the gradual enlargement of workers' margin of maneuver. This deep democratization implies significant changes in the structure and knowledge base of the various technical and administrative specializations....In the Introduction I mention a culture of responsibility, without which those on the bottom of the system are unlikely to demand changes in the distribution of power. To be effective, this demand must meet a sympathetic response from a significant fraction of the technical

elites to which it is addressed. Nothing can be done without their help and it cannot be enlisted by violence or administrative fiat. But would the technically qualified middle strata participate in processes that diminished their operational autonomy?" (*Critical* 155-6)

This lengthy quote serves as a good summary and a lead-in to the next research question and its subquestions:

Research Question #4

What was the role of the technical elite in making the decision to move to electronic publishing?

--Who is the technical elite within the company?

--What was their role in implementing the technology?

--What margin of maneuver did they introduce into the system?

--Did they primarily represent the interests of the management/corporate office or the workers/customers in that process?

In the case of the company I am studying, perhaps the most interesting facet of the move to electronic publishing was the lack of a technological elite when it came to electronic publishing. The company was faced with a complex decision with many possible technological choices. However, the very people who were most needed to help make that decision were the people who were being fired. The graphic designer—who went on to develop a company website for a future employer—was laid off, and his

wealth of experience with creating, designing and distributing documents was no longer sought or as readily accessible. Likewise, the literature coordinator, while perhaps not one of the "technically elite," also could have lent her expertise about the distribution of documents and perhaps could have learned some of the skills necessary for electronic publishing. The technical writer position, one which could have been filled with someone knowledgeable enough to both give advice and help with creating an electronic publishing system, was left empty, filled only by part-time graduate students who wielded little power and who were assigned other projects (this history will be explained in greater depth in Chapter 3).

So, in the end, the upper level management made a decision without the advice of the technical elite and without a technical elite to help implement the new technology. This technological void in both regards would seem to lead to one of two outcomes: the technology being implemented poorly or the technology not being implemented at all.

The laying off of key technological personnel leads to two key questions about the relationship between technology and downsizing and the technological literacy of those who remained with the company.

Research Question 5

How did technology influence that downsizing and deskilling?

-How did downsizing affect the production of documents, both who was producing the documents and how they were produced?

--How did downsizing affect the distribution of documents?

Research Question 6a

What was the level of literacy of those making electronic publishing and distribution decisions?

--What were the ramifications of having that level of literacy?

--What effect did downsizing and deskilling have on electronic publishing literacy?

In addition, the lack of a TE contributed to the instrumentalist view of technology. The TE, because of their middle position and contact with lower level workers and customers, would have a better understanding of the social, political and cultural forces which would contribute to the success or failure of a new technology. Without the TE's awareness of such forces and communication and recommendation of these factors, the owners would be less likely to take these considerations into account, thus viewing the technology absent of its socio-political dimensions. Ignoring the social, cultural and political dimensions of technology, as mentioned before, is the key trait and weakness of instrumentalist theory.

Technology and the User/Customer

Now that we have discussed the role of the ownership/management and the technical elite, it is imperative to look at the dialectic between technology and the user or customer. In *Critical Theory of Technology*, Feenberg largely overlooks the role of the consumer, only making a few passing references to the user or customer in the whole power scheme. This is a significant oversight in a culture in which technology is so

pervasive and in a customer base which needs technical literacy in order to use the products the company produces. Not until the 1995 work, *Alternative Modernity*, does he seem to fully recognize the role of the consumer. In fact, both of the case studies he uses in that book revolve around the role of the consumer in effecting positive technological change. In the case of AIDS patients, Feenberg explains how their literacy, their understanding of the disease, the drugs being tested and the process by which drugs were tested and approved, helped them effect change in the availability of experimental drugs for those dying of the disease. He cites Paula Treichler, "The strongest challenge to current conditions comes not from those who dismiss or denounce technology, but from those who seek to seize it for progressive political purposes and for the deployment of science and scientific theory in everyday life "(105). In other words, the more literate people are—the more they understand the technology and its influence on their lives—the more they can employ their knowledge to change how that technology is used. In the case of the French Teletel, the consumer population likewise used their literacy of the technology to deviate from its original, governmental intent. Had they not become proficient with the technology, they would have not been able to transform it and use it to the ends they chose. The French people would have either not used the technology at all or they would have simply used it in ways prescribed by the government.

Research Question 6b

What was the level of customer literacy in regard to electronic publishing?

--What were the ramifications of having this level of literacy?

Technology and the Customer-Company Culture

Finally, Feenberg's recognition of the role of the consumer is also evident in the definition of technical micropolitics, which involved primarily "users, clients, and victims" and not the workers or the state or the owners.

So, in my examination of the technical micropolitics at the company I am studying, I also look at the role of the consumer. This role is also central to a study of the technological setting I am examining because there is a very interesting relationship between the company and its customers. The relationship is too complex to detail here; that explanation will come in Chapter 3. Let me summarize by noting this: while the needs of a majority of the customers would seem to have the most influence on company technological policy, in this particular culture, the needs of a group representing only 5% of the customers carried the most weight. This group had the greatest level of technical expertise and the most advanced computer and internet capabilities. So, while a vast majority of the customers may not have been ready for electronic document distribution, the fact that the 5% group was ready was more important.

Research Question 7

What role did the customers play in the decision-making process?

--What impact would this decision, if implemented, have on the customers?

--What were the technical capabilities of the customer as they related to receiving documents electronically?

--How did the power structure within and without the company affect the decision-making?

Research Question 8

How did the history, standards and traditions of the culture and the relationship between the groups within the culture affect the decisions which were made?

Addendum

These questions stemmed from a combination of workplace literature, Feenberg's theory and from my initial data collection and guided my initial investigation. To be frank, I had also begun with another set of questions in mind, such as

--How do the electronic production/distribution changes affect the customers?

--What are customer attitudes toward the electronic option(s)?

--How many are using the electronic option(s)?

--How do the electronic production/distribution changes affect the company?

But, later on in the study, it became clear that I would need to adapt my research goals and methods to fit what was happening--or not happening--at the company. Specifically, *the company did not end up distributing their documents electronically.* (Three years after the study was completed, the company still had yet to move to electronic publishing and distribution.) As a result, some of these initial questions became unanswerable in the scope of my study. Since virtually no customers were receiving electronic documents, it

became impossible to document how electronic publishing affected the customers. In their stead, new questions arose:

--why did the company not begin its electronic publishing venture?

--how did issues of corporate image and costs affect the decisions?

--how did layoffs of graphics/writing/distributing personnel factor into the inability of the company to begin electronic publishing?

--how did lack of necessary hardware and software limit document production and electronic publishing?

The above section covers a broad and diverse set of research questions. The questions follow an outline based on groups outlined by Feenberg and dictated by the culture studied: owners, technical elite, and customers. This format worked best for introducing the questions, but to more logically present the key findings of the dissertation, another organization, based on main issues of culture, power, literacy and downsizing/deskilling, will be used. This organizational scheme will be explained in more detail below and in Chapter 2.

Hypothesis

The research questions and theory above led me to form a hypothesis:
If the introduction of new technology led to a democratization of the workplace/customer-company relationship, then it would be the result of having a technically literate customer base and a technical elite within the company sympathetic to

the needs of the customers. If the move to electronic publishing failed or the move failed to democratize the culture, it would be because of either the philosophy of the company in regard to technology or because of a lack of literacy on the part of either ownership/management, the technical elite, the customers, or all three.

OUTLINE OF DISSERTATION

While this first chapter includes these key questions and the background and theory leading up to these questions, the second chapter illustrates what research methods will be used to try to find answers to these guiding prompts. This chapter outlines the methodology employed in the collection and analysis of data. It begins with an overview of the choice to conduct an empirical study and the selection of ethnography over other empirical methods. I explain how I emulated some methods used by Cross in his studies of an insurance company and omitted and added other methods to fit the above research questions and the particulars of the culture being studied. One significant departure from Cross and many other ethnographers is the use of survey methods; I explain why inclusion of a survey helped gather data critical to my dissertation and why the company did not movedtoward electronic publishing and what methods they could have used. In addition to outlining my methodology in this chapter, I will also discuss the biases and limitations of the study.

Chapter 3, "The Culture and History of Document Production and Distribution," presents the "thick description," a detailed narrative of the history of document production and distribution in the site being studied. I outline a history of technical

writing, graphic creation, off-set press printing and mailing at the company and examine this in light of the culture of the company, customers and industry. In doing so, I also introduce the results of a survey of the customers which gauges their computer capabilities and document distribution preferences, and these findings will be examined in light of the management's perception of customer wants, needs and capabilities. Finally, the chapter explains how the decision to move to electronic publishing evolved and describes the initial efforts of the company to act on this decision.

While Chapter 3 gives the reader necessary background and delves into the "who," "what," "when" and "where" (or, in Kenneth Burke's dramatistic pentad terms, "agent," "act" and "scene") aspects as they relate to the research questions above, Chapter 4, " seeks to more fully answer "why" and "how" (in Burke, "agency," "purpose" and a term he added later, "attitude"). To do this, I use data analysis techniques outlined by Miles and Huberman to break down and reassemble information from documents, interviews and observations. This chapter, "Power, Literacy/Technology and Deskilling/Downsizing," maps the power structure and various workforce reductions and ties them in with technological advancements, showing how new computer technologies made downsizing possible, especially after 1995 when the company chose to move toward electronic publishing. The chapter also contains an examination of how the role of technical communication and the technical writer change as a result of economic and technological changes, and how the literacy of the technical elite, the ownership and customers are affected by these changes. The effect of the technology is analyzed in the context of Feenberg's tripartite distinction between the different approaches that can be

taken toward technology. Likewise, Zuboff's theories of "deskilling" and automating vs informating are intertwined in this analysis of company personnel changes.

I originally was going to devote part of the dissertation to an examination of the company's choice of electronic publishing medium and how that choice affected document production and layout, paper document distribution and the company and customers as a whole. Because after two and a half years the company had not yet begun using electronic publishing--in spite of an original six-month goal—the fifth chapter will instead discuss why the company had not moved to electronic publishing and discuss the implications of the findings on the field of technical communication and on professional writing pedagogy. The chapter will also suggest avenues for future research into the effects of technology and downsizing on document production and distribution in the workplace.

CHAPTER 2: METHODOLOGY FOR INVESTIGATING DOCUMENT PRODUCTION AND DISTRIBUTION

Before seeking answers to the questions raised in Chapter One, it is necessary to first provide more background about the culture being studied and the methodology used to collect and analyze the data obtained from that culture. The first part of this chapter outlines why this particular setting was chosen and provides a brief background about the company, its employees, its customers and its document production and distribution systems. The second section details the ethnographic methods used and the reasons behind employing a survey in the study, as well as the details of that survey and survey method. In the third section, I explain how this data is used to create a description and a narrative of the culture in Chapter Three and how I break down the research questions into three main categories (literacy, power, and downsizing/deskilling) and describe the schemes to code and analyze the data to answer the questions in those categories. The chapter concludes with an explanation of data collection methods not able to be employed because of the constraints of the site and situation.

TOPIC/SITE SELECTION AND COMPANY BACKGROUND

While I combine various methodologies in this dissertation to help work toward a "multimodal approach," (see Lauer and Asher, Thralls), the main thrust is an empirical study, an ethnography of a workplace. The decision to take this approach initiated by a fortunate (for me, not the employees laid off) turn of events at the company where I had been working as a technical writing consultant. In February of 1995 I found out from

company employees that approximately one-third of the employees were being laid off, including the graphics manager and literature coordinator. I asked the marketing director how the company was going to produce and distribute documents, and he replied that the company vice-president (the head of the plant) wanted to have the company start distributing its documents electronically.

While my first thoughts were of the plight of the graphic designer and others I had worked with who no longer had jobs, I later realized that the company's situation provided a unique chance to study how technology and downsizing--two key facets of technical communication in the mid-1990s--affect technical writing at a company. This situation played a huge role in the decision to employ an ethnographic methodology. Before explaining my methodological choices, I will first provide a description of the site in order for the reader to better understand the reasoning behind those decisions.

Overview of the site

Hammersley and Atkinson (1995) state the nature of the setting chosen for an ethnography "often plays a significant role in shaping the way in which research problems are developed" (36), and that is especially true with my study, since the initial impetus to conduct the study was not found in previous theoretical research, but in the situation at the site itself: "Sometimes the setting itself comes first--an opportunity arises to investigate an interesting setting" (36). For some ethnographic studies, much work goes into choosing an appropriate setting; in my case, the site selection was the easiest task of all.

The factory examined in this dissertation is based in the Midwest and produces electric meters (which determine household and commercial electric bills) for the utility industry. The factory is only one branch of the company, which is owned by a European firm. Other branches produce other electrical products and services, such as devices which can help monitor and cut down on electrical use within a building. The factory employs about 500 people, which includes three shifts of assembly workers, in addition to personnel in engineering, marketing, purchasing and accounting departments. While the factory is a branch of a larger company, most everything is done independently of the

other branches. The products are designed by engineers at the site, who work with the software developers and production personnel. The marketing department handles product support and produces and distributes promotional material. The technical documentation is written by engineers in collaboration with marketing personnel and consultants.

Overview of Document Production/Distribution at the Company

In the late 1980s, nearly all of the literature was produced in house by a technical writer, a graphic designer, a photographer, a document coordinator, and a print shop which printed almost all of the promotional and technical literature. In 1997, none of those people were employed at the company because the company was losing money and eliminated many of these and other positions in order to cut costs. The technical writer position was terminated in 1990. Over the past several years, downsizing claimed all of the other document-related jobs. The print shop, which was part of the marketing department, was eliminated about in 1994. The graphic designer, who was responsible for page layout of almost all the marketing documents, was laid off in 1995 and his equipment was sold. Currently, much of the literature is being farmed out to various individuals and companies. The former graphic designer is now doing consulting work for the company, and the company also uses other consultants to help in writing and producing technical documents and product literature. Local printers handle almost all of the printing. While the director of marketing feels this outsourcing has improved some documents (Stetler, 1996a), other employees have remarked that the outsourcing has led to a decline in document quality (Miller, 1996; Martin, 1996a).

(An in-depth history and analysis of document production will be provided in Chapter 3).

METHODOLOGICAL CHOICES

The choice to study the writing situation at the company in itself helped frame the dissertation primarily as an empirical study as opposed to other methods of research in composition/professional writing: historical, linguistic, philosophical and rhetorical (Lauer

and Asher 1988). As hinted at above, historical methods will also be used in succeeding chapters, both in terms of company history and recent histories of document distribution methods. Rhetorical (through the analysis of some of the documents produced) and philosophical inquiry (through the application of professional writing and critical theory) into professional writing is also part of the study, but the main focus of the study is empirical.

At the beginning of the study, there were several empirical options that I considered from the ones outlined by Lauer and Asher (1988): case studies, ethnographies, surveys/samples, quantitative descriptive studies, prediction/classification, true experiments, quasi-experiments and meta-analysis. A meta-analysis was not appropriate, of course, because I was focusing on a culture, not a group of studies. True experiments and quasi-experiments were also not feasible, because of the uniqueness of the situation and my power (and lack thereof) in relation to any companies involved. Conducting a true or quasi-experiment in a workplace setting is very difficult to begin with. It would be impossible to compare groups or individuals from one company to another because of the myriad political, economic and social factors which influence writing, and access to any other similar company would have likewise been impossible, given the tight competition between the four companies in the industry. Randomizing groups within the company being studied for some sort of true experiment was also not possible, given the wide diversity of job duties. A quasi-experiment would also not have worked because of the difficulty in setting up a control group and a group to test effects of treatments. The many uncontrollable outside factors (again, politics and economics and social relationships amongst the employees) would render any cause-effect relationships about document production/distribution questionable at best. In addition a true or quasi-experiment would not yield the type of thick description that would be needed to describe and analyze how documents were written, laid out, printed and sent out. For all of the same reasons listed above, prediction/classification and quantitative descriptive studies were also not practical or useful alternatives. In brief, all these quantitative options were not feasible. As Dautermann (1993) so aptly put it: "Research into such matters does not easily fit into the paradigms of controlled and statistically validated

research of the social science tradition but is accessed more appropriately through the ethnographic tools that provide for observing the externalized composition processes in collaborative writing sessions and the social contexts in which they function" (100).

A case study approach was much more tempting, given its qualitative nature. A case study, an empirical study of a person/example as opposed to a site/culture (Sullivan and Spilka, 1992), of the graphic designer would have provided interesting data about document production, but with his termination the research would have necessarily been after the fact and would have not been able to include information about the decisions and actions after he left, which are the most interesting parts about the study. A case study of the marketing director was another option. He made most of the decisions concerning what documents were produced and who produced them, and he reviewed the documents. But, he did not write or distribute any of the documents, and a case study solely on him would have necessarily omitted key information. A case study of an engineer writing and laying out documentation because of the cutbacks in technical writing/page design staff would have been very interesting, but again would have limited the scope of the study. And, as Selzer points out, "attention lately has shifted from individual writers and their finished products to the environmental factors that shape them" (172). Even a multiple case study of several engineers writing documentation would not have been as useful, since the study would still be limiting and because there was only one full-time employee producing external documentation in 1995-96, a software manager. Frankly, another concern of doing a case study approach of one person was that that person being studied could be laid off, could be reassigned within the company or could leave the company at any stage of the data collection process. Two engineers who would have been prime case study candidates did in fact leave to take jobs with other companies, in large part out of fear of being laid off or the company going under. The software manager who did some writing was reassigned to another position in the middle of my study, at the same time that the marketing director was demoted to another position. Needless to say, I was happy I did not to use a case study approach in examining just one individual.

I could have used a case study approach in looking at just the company; however, this approach also would have been limiting. What I was most interested in was the entire

culture. The fascinating part of this study was the connections between the employees, the customers, the distributors, the upper management and technology. The interesting history and dynamics of these connections led me to want to study the entire culture in depth, and thus choose an ethnography instead of a case study approach.

Ethnographic methods

Because I was going to be looking at a company and the culture of the groups inside and outside the company, my preferred choice for a dominant research paradigm was ethnography. As elaborated in Chapter 1, my goal was to discover how downsizing and technological advances affected the creation and dissemination of documents. In order to understand all of the factors and decision-making which affected these processes, I had to understand the culture of the company. I needed to use several research sources and methods to provide thick description of how the history shaped the mindset of the company and its employees, how the economic situation impacted technical writing and how social networks and power structures played a role in the actions of the company. Ethnographic research, because it "examines entire environments, looking at subjects in context" (Lauer and Asher 1988, p. 39), was ideal for investigating the situation and the company and helping answer the posed research questions. Ethnographic methodologies are becoming increasingly common, as Faigley predicted in 1985: "Because qualitative research offers the potential for describing the complex social situations that any act of writing involves empirical researchers are likely to use qualitative approaches with increasing frequency" (243).

Several types of ethnographic research methods were employed in this study, including interviews, field notes and document analysis. To a large degree, I followed the model of the insurance company research conducted by Geoffrey Cross. Cross, in his seminal studies of the production of an annual report letter (1990) and a corporate annual plan (1993), was interested in the factors influencing the production and revision of these documents. He used open-ended interviews (which were later transcribed and coded), document analysis and document-based interviews and field notes (Cross 1990, p 176-

77). A significant part of his research was used to create a chronology of document production; likewise I used multiple sources to construct a timeline dating back to 1971, in part creating an ethnographic narrative (Brodkey, 1987). While he encountered a failure of a group writing situation, I also center my study around how the decision-making process (especially in terms of decisions involving technology), internal communication and culture of the company contributed to a technical communication failure. To a lesser extent I also follow some of the strategies employed by Doheny-Farina (1986), who also relied on field notes, open-ended interviews, discourse-based interviews and tape recorded meetings.

For Cross and many other workplace researchers employing ethnographic methods, internal and external company documents were vital ingredients in their research. Accordingly, I collected the following documents which caused an impact on or were the result of document producing/distributing decisions.

Internal Company Documents

These documents helped answer the guiding questions about the influence of the background of the company on what decisions were made and why they were made.

- Financial documents relating to document production/distribution
- Phone logs of requests for product literature and documentation
- Electronic mail
- Internal memos
- Internal reports
- Agendas/Minutes of meetings
- Organizational Charts

External documents

- Product literature
- Technical documentation
- Company catalogs

Internet Research

Information from Internet research was used to help answer the research questions about the methods of electronic publishing available to the company.

- Internet pages of international sites and U.S. and branch sites
- Internet research of competitor's pages
- Internet research of other organizations distributing their documents via the Internet
- Other Internet pages relating to costs and statistics of putting documents on the Internet.

Interviews

Cross and many other ethnographic researchers used interviews heavily in their studies. Likewise, one my primary research strategies was to conduct interviews with key personnel involved in the production, distribution and reception of electronic documents. These surveys were formal in some cases, but in many other cases I relied on informal conversations with participants (Odell and Doheny-Farina, p. 522). This included a wide range of company personnel at the factory and other company branches, in addition to customers. The information gained from these interviews was instrumental in determining why decisions were made, how people were impacted by the decisions, and what could have been done differently. The following people were interviewed about their role in helping make the document production/distribution decisions and/or how they were influenced by those decisions:

- marketing personnel, salesmen, product distributors, customer representatives
- engineers, software designers, Information Services personnel, product support specialists
- former graphic designer
- part-time software and technical writing consultants
- customers
- marketing director of other branch of company

Like Cross, I made the decision to tape record and transcribe all of the formal interviews, knowing that such transcription would add greatly to the amount of work involved. I chose transcription to help maintain the integrity of the data, to help in coding and to better allow for the subjects to be more active participants in the narrative of the events. I realized early on that just taking notes during the interviews would not be sufficient, since the brief informal conversations that I documented in my field notes were very rich, in spite of the brevity of those conversations. Taking notes only would have caused me to miss important information, especially since what was deemed unimportant during the interview (and thus not worthy of writing down) in many cases became very important later in the study. The length of the study also made transcriptions very useful, since even careful notes might not be able to be recounted or understood two years later. While I could have taken notes and also tape recorded conversations for reference, my changing approaches to the study would have meant that I would have had to spend a lot of time hitting play, rewind and forward trying to find the key information on hours and hours of tapes. The transcriptions also made coding much easier, and they made the coding process that much more reliable, since I was able to work straight from their words instead of from my mental interpretations of their words (once removed) or my writings which translated those mental interpretations (twice removed). The other reason I transcribed the interviews was the importance of providing a more thorough, "real" narrative of the history and present state of document creation and dissemination at the company. I had planned from the beginning to try to include frequent quotations from the participants in this dissertation because I knew those comments coming directly from the employees would make the account more interesting and lively and help capture the spirit of the mentality of the culture, which lies at the heart of an ethnographic study like this.

Survey methods

Cross does *not* employ survey methods in his study, in large part because his focus is on document production of non-user tested paper documents. Because he studies the writing of an internal document (the annual plan) and the external document (the executive letter) which was not user-tested with customers--both documents are

disseminated in paper form--he is naturally less concerned with the customers in the process. Because my study concentrated heavily on various means of distribution, I was necessarily more concerned with the customers and their document acquisition and reading situation.

The use of a quantitative method in a qualitative study like an ethnography may at first seem incongruous. Traditionally, quantitative measures like surveys are not used in ethnographic studies, and, as Sullivan and Porter note, "Methodological flexibility may be more controversial, as it directly opposes the limited view of methodological rigor as strict adherence to a preset list of methodological rules and regulations as the basis for deciding the quality of the research" (69). However, as I will explain below, there are several reasons why the incorporation of a survey was not only acceptable, but a theoretical and methodological necessity and an approach which is in line with the recent call of researchers to expand traditional conceptions of research methodology to better study the complex interactions in professional writing.

To begin with, while there may be a strong qualitative/quantitative split in many of the social sciences, the combination of such methods in studies of non-academic writing is not uncommon, as evidenced by the inclusion of survey methodology in three articles in *Writing in Non-Academic Settings* (Paradis, Dobrin,& Miller 1985; Couture et. al., 1985, Halpern 1985).

I also needed to include the survey to match the theoretical framework for my study. After reading the work of Feenberg, it became clear that the research needed to encompass the entire *culture* which was being affected. Feenberg talks about the necessity of dialectic, of consensus among all of the groups involved in a decision involving the implementation of technology. Looking solely at the company would yield a necessarily narrow perspective about the use of technology within and without the company and the means by which company decisions were made and implemented. To use an analogy, employing only qualitative measures aimed at studying the company would be the equivalent of looking in only one window of a house and surmising the layout and framework of the entire structure. Burke's concept of "terministic screens" is applicable

here, as he notes that these screens, in allowing us to see the world in a certain way, necessarily blind us to other ways of seeing.

To be able to look in more of those "windows," to gain new viewpoints, additional methods and subjects were also needed. Because the culture of the electric meter community involved distributors, electric utility companies and the individual workers who actually installed, used and fixed these devices, my study naturally needed to include these factions. While ethnographic research methods such as interviews were still used in studying this expanded group, the size and diversity of the culture mandated a means which would provide a more accurate representation. The best tool for obtaining such a representation of the estimated 2,000 members of the customer database was a survey, which is detailed later in this chapter.

The fact that the documentation was being produced for customers made them a part of the culture, even if they were, in Ong's terms, "fictionalized," or invisible during part of the decision-making process. Had an electronic publishing system been implemented, its success or failure would have been largely dependent on the attitudes and capabilities of the customers. While the interviews conducted with customers helped gain information about them, the survey was a much more reliable indicator of the population as a whole. Had I relied only on a few customer interviews, I would have had a skewed view of the thousands of customers and users of the company's documents. The same is true about the interviews with marketing personnel, since their generalizations about customers made in interviews did not necessarily match the information gleaned in the customer interviews and the survey. Including the survey lead to methodological triangulation, which, "at any level test emerging patterns by increasing the possibility of finding negative cases and countering the bias of any one approach" (Odell and Doheny-Farina, 1985), The survey provided a perfect example of the value of triangulation in research, and at the same time helped clearly show the gulf between the customers and the marketing department's perception of customers, a gulf that has dramatic ramifications on decision making.

The inclusion of a survey was also prompted by Mirel's (1993) work with audience analysis in professional communication. She argues that "Researchers must begin

to analyze audience needs in light of contextual influences" (22). At the end of her article, she asks a question researchers and practitioners need to consider: "What instructional design and media are best, given workplace users' demonstrated means for acquiring help?" (38), a question the company needed to consider more. The survey helped provide important information about the users of the company's documents and how their constraints might affect document production and distribution.

In addition, the information gained from this survey not only helped with this study, it also helped the company and will hopefully help the field see what the electronic publishing capabilities and attitudes are within an industry and provided key information about the computer literacy of the customers. If they do not have a CD-ROM, WWW access or email access, it is clear that they are likely to have a low level of literacy when it comes to documents produced exclusively for these media and thus are also likely to have problems with such documents and be less inclined to want to change. Had I based my analysis of customers' computer literacy and capabilities on a few interviews with customers, I would have had a skewed view of their situation and attitudes toward electronic documents. The same is true had I relied solely on the comments made by the marketing director and other marketing personnel. The survey revealed data that were important that could not have been revealed by other methods. This data led to the understanding of how company decisions about document production and distribution would have affected customers as readers and users.

The use of a survey also served another purpose: to give the customers a voice through a means that the people in power would find legitimate, and to give that information to the decision-makers for the benefit of everyone involved. This ventures into an ethical aspect of the study. Researchers, Sullivan and Porter (1997) believe, have an ethical obligation to the people being studied, and work from feminist ethics to provide the principle "care for others. " Working from Krisch and Ritchie, they state "Caring for participants as individuals, and out of a spirit of concern and commitment, is how we should construct our ethos as researchers" and that researchers "should be motivated by a commitment to the participants, a concern for their welfare" (113). To be frank, after discovering the plan to distribute documents solely by electronic means was formulated

without consulting the people who would receive those documents, I was concerned that the decision could have a detrimental effect on the company. The survey was one means of providing the input of the customers (albeit after the fact), and a means which would have much greater rhetorical effect on the decision-makers than selected interviews with a handful of customers. The survey served a dual ethical purpose, as well: to give a voice to the customers, those who were silenced in the decision making process. This, too, is in line with Sullivan and Porter, who view "Liberation of the oppressed" as a fundamental ethical goal for human activity, including ethical research praxis" (118).

Finally, the use of a survey in this predominately qualitative study is also in line with the call of researchers in professional writing to break down the barriers between methodologies. I felt that taking a rigid approach to ethnographic research would not be appropriate, and instead heeded Sullivan and Porter's 1993 call to "develop more elastic notions of 'case study,' 'ethnography,' and so on, and adapt these methodologies to fit circumstances" (237). In *Opening Spaces* (1997), they further explain their desire to see research methodologies rise out of the context being studied and view "method" with a small "m" rather than a capital one: "Our critical practices perspective sees methodology for the study of writing not as a rigid set of structures to be applied without question to a set of writing phenomena. Rather, we see methodology as heuristic" (9).

Description of survey

The survey, conducted in early August 1996, was four pages long and contained approximately 35 questions, including multiple choice, Likert scale, ranking, short answer and open-ended questions. Despite the length, the format of the survey allowed the respondent to answer all of the questions in about 10 to 15 minutes.

The survey was distributed to the three types of customers: Investor Owned Utilities (IOUs, usually very large companies), rural electric cooperatives and municipally-owned utilities. Because these three categories were able to be separated by the company's database software, lists of the companies in each category were generated, and a systematic random sampling technique (Lauer and Asher 1988; Anderson 1985)

was used. Every fifth company on this lists (over 2000 companies total) was selected in order to reach the total sample size of 450.

Questionnaires with both open-ended and closed ended questions were sent to the users of these documents at the companies (the marketing database list was targeted for distribution of catalogs and technical manuals). I followed most all of Anderson's (1985, p. 467) advice about constructing a survey: I made the survey look easy to fill out, provided a prepaid return envelope, included a cover letter explaining the value of the research and printed the cover letter on company stationery. I also put the more controversial questions toward the end; to put more neutral questions at the beginning I put in some demographic questions.

Because the company had some factory workers available to help the marketing department's administrative assistant (due to repetitive stress disorders they were temporarily not able to work in their normal positions in the factory) these employees were enlisted to fold the four-page (two pages, front and back) survey and one-page cover letter and a stamped envelope with the company's address in an 8.5"x11" company-marked envelope. These were sent August 1, 1996 and their return was requested for August 15, two weeks later.

A total of 87 companies responded, a 20 percent response rate, a bit lower than expected. As a result of this lower response rate, the results must be interpreted with this rate in mind. More than likely, the results indicate a higher level of computer capabilities than really existed, because those individuals with a 286 CPU and DOS as their top operating system may have been hesitant in admitting this to the company which supplies their meters, even though these people would typically have the most to lose if an electronic document distribution system were put into place. In addition, people who are not cognizant of --or who are intimidated by--computer and Internet features would be less likely to return the survey. On the other end of the spectrum, it is easy to see how a computer expert with a 130mhz Pentium, a 8x CD-ROM and a 28.8 modem (top technology in 1997) might look at the survey more enthusiastically and be more willing to send it back. So, the reader should keep these factors in mind when looking at the survey results.

The director of marketing and other company were interviewed to gauge their expectations of customer responses to the survey questions. These expectations are compared with actual survey results in Chapter 3 and 4.

Distributor survey

I also conducted a survey of distributors of the company's products about their capabilities and their perceptions of the customers' capabilities and preferences in regard to electronic publishing. This survey was helpful for two reasons. First of all, it provided yet another means of finding out/verifying the capabilities of the customers. Secondly, it provided an overview of the capabilities of the "middleman," the person who would play a role in receiving and distributing documentation and interacting with customers. In short, if the distributors were not able to handle any of the electronic means of document distribution, then these people would not be able to serve their customers well and answer questions about the operation of the product, most likely resulting in lost sales in the future.

Thirteen distributors were contacted by phone and given an abbreviated list of survey questions to answer. These 13 distributors--members of separate companies who also sell other electric-related products--were not selected from the total number of 50 distributors by random; instead, they were chosen because of the following reasons: 1) geographical diversity; 2) type of area being served (rural vs. metropolitan); 3) availability (many were on vacation or out on the road); 4) some companies had multiple distributors in the same state (i.e., only one of the six Texas branches of company X were contacted, since early responses indicated a similarity in computer capabilities). These distributors, 25 percent of the total number of distributors, were contacted between December 15, 1996 and January 20, 1997 and were asked the most critical questions: computer hardware/operating system, modem availability, WWW access, CD-ROM capability, and a ranking of their preferred document distribution method. They also tried to gauge what their customers' WWW access figures were, in addition to their customers' document distribution preferences.

ANALYZING/REPRESENTING THE DATA: CREATING A CHRONOLOGY AND DESCRIPTION OF CULTURE

This section outlines the data analysis and display methods used for Chapter 3, "The Culture and History of Document Production and Distribution." This chapter seeks to provide a background of the culture and answer the following research questions from Chapter 1:

-- What theory of technology did the company management take? Did they take an instrumental, substantive, or critical approach to the technology they introduced into the company?

--What decisions illustrated this theoretical approach?

--What were the ramifications of taking this approach for the company, the workers and the customers?

--What were the priorities of the customers?

--What priorities overlapped with the company's?

--What customer priorities were neglected?

--How did the history, standards and traditions of the culture and the relationship between the groups within the culture affect the decisions which were made?

These questions are answered through a narrative and description. Creating a chronology of events, similar to that of Cross (1990) and Doheny-Farina (1986) was one of the first parts of working with the data and representing vital background information to the readers. The organization charts were the foundation of charting a chronology of document production and distribution (see Chapter 3). I went through the company's organizational charts, which were issued as often as twice a year in some cases and every other year in other instances. Memos and phone directories were used to fill in any gaps in the charts. I supplemented this organizational chart analysis with interviews of employees who had been a part of the company for more than a decade. The interviews concerning the most recent years were especially helpful in documenting why certain positions existed or were eliminated.

I created a table listing each document-oriented position on the left hand column and placed the years along the top to illustrate what positions were occupied during what years, essentially a role-by-time matrix (Miles and Huberman p. 127). I also used an event listing (p. 112) to show the key events and layoffs, along with an event flow network (p. 114) to show the steps and personnel involved in the document production and distribution cycle.

In presenting this narration and description, I am following what Van Manaan (1988) describes as a "realist tale," a largely third-person, objectively-written account of the chronology of events and the details of the site and culture. The dissertation also contains other forms of ethnographic writing in other sections. Van Manaan notes that confessional tales "also appear, with increasing frequency, as separate articles, chapters of books devoted to fieldwork practice, or lengthy appendixes attached to realist monographs" (75), and indeed there is a confessional about my biases and methodological weaknesses and possible oversights at the end of this chapter. He adds that "it is pro forma these days to append a confessional to a fieldwork dissertation or to include one in a separate chapter of the thesis under the 'methods' label" (81); I have chosen to conclude my discussion of methodology in this chapter with a confessional tale.

In presenting my largely realist tale, I do not subscribe to the traditional stance of Experiential Authority described by VanManaan, instead integrating myself into some of the narrative and analysis, since I was more than just a outside observer through this process. I do try to take a native's point of view (p. 49) in many sections, by including many carefully selected quotes to have them explain their situation and culture, but am also careful to interpret their comments, adding in the benefit of my academic and semi-outsider background. While I am a part of the narrative, I try not to focus too much on myself (confessional) or the method (impressionist) in the telling of the tale, because such approaches are rare in professional writing and because it is the culture and results of the study which are most interesting.

This dissertation also contains elements of what Van Manaan categorizes as "Critical" and "Formal" tales. Critical tales, which frequently are imbued with Marxist leanings, seek to reveal insights into "larger issues, particularly those concerning the

political and economic workings of capitalist societies" (128). After reading Chapter 1, one can easily see how issues of power and economics as they relate to the integration of technology are central to this dissertation. The use of Feenberg and Marx also render this study somewhat of a Formal tale, in that the data is analyzed and interpreted through the lens of a theory and in doing so limits other interpretations.

ANALYZING/REPRESENTING THE DATA: EXAMINING POWER, COMPUTER LITERACY AND DOWNSIZING/DESKILLING ISSUES

Analyzing and coding the data

Four factors affected my coding schemes for analyzing my field notes, interviews and documents: electronic publishing options, theory, research questions/goals and the data itself. These four facets helped guide me in how to code my data and how to organize and present that data in text, matrices and maps.

As I mentioned in Chapter One, my research questions fell into but a few main categories, which I've used to divide up my dissertation: Culture, Power, Literacy/Technology and Downsizing/Deskilling. Because of that breakdown, I used abbreviations to reflect those categories when coding my data, using slashes to indicate further subcategories. For example, when examining the medium level of power exerted by investor-owned utilities in the company moving to distribute documents via the Web, I used the following code: P/IOU/W/M. In general, my coding followed this general formula: main category (power, literacy, downsizing/deskilling, culture), followed by person or group involved, followed by the aspect being examined (the method/technology of document production and the method/technology of document distribution) , followed by a rating of a level or degree (of influence, of literacy, of impact). As one can see by the chart below, I look at the same people and same aspects through different viewpoints. Taking this approach was very useful, because while the data revealed interesting information regarding the role of power of a particular group regarding a method of document distribution, the data was likewise interesting in showing the literacy of that

group with that method and the effect of that method on downsizing and deskilling and how ingrained that method was in the company or customer culture.

The matrix below is used to give the reader an overview of the data analysis categories; when it comes time to present the data, I will use different charts which show some of the intersections of these categories and comparisons between sets of data (example: showing how the group with the lowest level of literacy with a distribution method also had the least amount of power in choosing that method).

Table 2.1 Data coding scheme table--Power

Main category	**PERSON/GROUP** IOU (big utitlites) MR (mun/rural) Con (consultant) Mkt (mkting head) PM—product man.	**ASPECT** **EXAMINED**	**LEVEL/DEGREE**
Power= P		**Dist. Method** PP=paper Disk, CD, Email F=fax W=web	**Level of influence** H= High M=Medium L= Low 0=none
		Web content	
		Publishing software	

Table 2.2 Data coding scheme table--Literacy

Main category	**PERSON/GROUP** IOU (big utitlites) MR (mun/rural) Con (consultant) Mkt (mkting head) PM—product man.	**ASPECT EXAMINED**	**LEVEL/DEGREE**
Literacy = L		**Production Tech** Word PM=Pagemaker PS=photoshop/scan Draw=drawing	**Degree of literacy** 0=no access A=Access to tech R=Reading—basic W=Writing--adv
		Dist. Method PP=paper Disk, CD, Email F=fax W=web	**Levels of lit.** 1=low level 2=medium level 3=advanced level
		Dist. Method PP=paper Disk, CD, Email F=fax W=web	Sp=Speed $=Cost Conv=Convenience Img=image of co.

Table 2.3 Data coding scheme table--Downsizing

Main category	**PERSON/GROUP** IOU (big utitlites) MR (mun/rural) Con (consultant) Mkt (mkting head) PM—product man.	**ASPECT EXAMINED**	**LEVEL/DEGREE**
Downsizing/ Deskilling=DD		**Production Tech** Word PM=Pagemaker PS=photoshop/scan Draw=drawing EP=Electr. Pub	**Level of influence of tech on downsizing** H= High M=Medium L= Low 0=none
		Production Tech Word PM=Pagemaker PS=photoshop/scan Draw=drawing EP=Electr. Pub	**Downsizing effect** Sp=Speed $=Cost Q=Quality (+, = or – for degree)
		Dist. Method PP=paper Disk, CD, Email F=fax W=web	**Level of influence on downsizing** H= High M=Medium L= Low 0=none

Table 2.4 Data coding scheme table--Culture

Main category	**PERSON/GROUP** IOU (big utitlites) MR (mun/rural) Con (consultant) Mkt (mkting head) PM—product man.	**ASPECT EXAMINED**	**LEVEL/DEGREE**
Culture=Cul	Company culture	**Dist. Method** PP=paper Disk, CD, Email F=fax W=web	**Degree ingrained** H= High M=Medium L= Low 0=none
		Production Tech Word PM=Pagemaker PS=photoshop/scan Draw=drawing EP=Electr. Pub	Same
	Customer culture	**Dist. Method** PP=paper Disk, CD, Email F=fax W=web	same

For the most part, the units of analysis used in this coding were phrases or sentences found in my field notes and in the 100+ pages of interview transcripts. I went through the notes and transcripts with four different colored highlighters to highlight items for the four categories of culture, power, literacy and downsizing. After doing this, reading through the literature, re-reading Feenberg and Miles and Huberman, I sketched out categories and possible matrices and after going back and forth between the data and theory, came up with the categories above, and went through and coded the data accordingly. For some of the data, I used other types of data and thus other units of analysis:

Document features

-instances of links, product information, email contact info, etc. on web sites

-quality of visual appeal (evaluating scans and page layouts to determine high, medium or low proficiency with those technologies)

-program used to produce the document (Word, Pagemaker, HTML editor)

-reproduction methods used

Secondary/Background research information

-Company memos and reports outlining electronic publishing plans and cost data (again, coding phrases/sentences which contained pertinent data)

-Figures in academic and trade journal literature for cost and turnaround time for document production and distribution (applying these estimates when other data was not available)

Survey data

-Significant sections of the power and literacy section relied upon this qualitative data analysis

Representing the Data

Power

This section analyzes how Feenberg's theories about the relationship between power and technologies played out at the company being studied. It attempts to answer these research questions introduced in Chapter 1:

How was technology at the company used to further the power of the owners/management?

--Who was making the decisions?

--What technology was introduced to further this power?

--How was the implementation of this technology a reflection of the power structure?

--What was the role of the technical elite in making the decision to move to electronic publishing?

--Did they primarily represent the interests of the owners or the workers/customers in that process?

--Who is the technical elite within the company?

--What was their role in implementing the technology?

--What margin of maneuver did they introduce into the system?

--Concerning the web-based option, the one most favored, what implementation changes could have involved the workers and customers more?

--What role did the customers play in the decision-making process?

--What impact would this decision, if implemented, have on the customers?

--How did the power structure within and without the company affect the decision-making?

Most of these questions can be reduced to one basic question: What power did the ownership/management, the technical elite and the customers exert in the document production and distribution decision-making process?

The best way to answer this question is by using a role-ordered matrix, as outlined by Miles and Huberman (1994, p. 122-127). The matrix, which sorts data by rows and

columns, allows the reader to quickly glean what roles wielded the most power. As seen in Table 4.5 in Chapter 4, I used the left column to outline the roles, using a general continuum with the Corporate Headquarters managers at the top, down through the branch managers, through department heads, consultants, and technical support people to distributors and customers, making sure to differentiate the IOUs from the municipal and rural electric companies, for reasons outlined in Chapter 3 (marking clear divisions between management, technical elite and customers). The top row contains the main categories used in coding the data, which were determined by the four main technology decisions as they relate to the dissertation: distribution method of documentation, web page content (corporate/US/company-branch), choice of publishing software, and use of e-mail communication. In each grid box is room for comments, along with a rating system:

H—High. These people were capable of making the decision

M—Medium. These people's opinions were sought and significantly influenced the decisions

L—Low. These people's needs might have been considered somewhat and they might have rendered some unsolicited advice.

0—Zero. These people were informed of the decision after the fact.

This matrix will later be compared with a similar matrix regarding literacy, and the combination of the two will demonstrate the relationship—or lack of a relationship—between knowledge about the technology and the power to make that change.

A similar matrix will be used to show who benefited from the actual decisions made. The role column remains the same, while the row contains slightly different categories to reflect the options that the company chose at one time or another. I also use a causal matrix to demonstrate the effect of the technological changes on increasing or decreasing the power of the people and groups involved. Finally, I will analyze the websites produced by the company and its competitors, relying on the levels of power/interactivity described by Ramey (2000). Her taxonomy will be described in Chapter 4.

Literacy

Several of the questions raised in Chapter One relate to literacy:

What was the level of literacy of those making electronic publishing decisions?

--What were the ramifications of having that level of literacy?

--What effect did downsizing and deskilling have on electronic publishing literacy?

What was the level of customer literacy in regards to electronic publishing?

--What were the ramifications of having this level of literacy?

Again, a role ordered matrix works well in showing the literacy levels of the various roles, or groups, involved in this document production and distribution. The information for this chart was taken from the survey of the customers, along with coded data from observations/field notes and interviews.

These categories are broken down into three main categories, or levels, based on the discussion of literacy in Chapter 1 and Chapter 4: Access, Reading, Writing. Within each of these categories is a further gradient, L, M, H (Low, Medium, High), to provide a more detailed insight into the literacy levels. For example, in regard to web page literacy, a person with Writing ability might be at a Low level (the ability to create a very basic page and post it to the web), a Medium Level (the ability to create a professional-looking page with a few bells and whistles) or a high level (the ability to use forms, perl/java, create on-line ordering/e-commerce capabilities for the site)

I used two role-ordered matrices, one for document production and one for document distribution, since literacy was a critical issue in both arenas. I also used a time-ordered matrix to show how literacy levels changed between the time the study was begun and when it was completed. A role-ordered matrix was also used to illustrate the literacy when it came to document production

Tied in closely with technical literacy, is, of course, the technology itself. Over the course of the study, the technology changed and improved, which affected the technological choices for the company, the literacy of the users with the new technology

For an analysis of the technology-related changes, I used a time-ordered matrix. This allowed me to most clearly show how time and technology changed the company's technological course. Here I have combined document production and distribution into the same chart, although they are split. I use the time frame of years for the top row of the matrix, using 1994, 1995, 1996, 1997 and 1998 (see Fig. 3.8 in Chapter 3) For the rows I included the areas of change for both the technology and the company: web-based technologies, the company's electronic publishing direction, document production technologies, the company's production technology usage, the people involved in document production and the company ownership changes. To create and fill in this chart, I used a combination of methods: interview transcription coding, field notes, technology journals and magazines and organizational charts.

Downsizing/Deskilling

This last section of the chapter answers the remaining research questions:
--How did technology influence that downsizing and deskilling?

--How did downsizing affect the production of documents, both who was producing the documents and how they were produced?

--How did downsizing affect the distribution of documents?

--What effect did downsizing and deskilling have on electronic publishing literacy?

In order to answer these questions, a variety of data display types will be used. A role-by-time matrix will show how some positions disappeared and how their tasks were taken on by those inside and outside the company. A conceptually clustered matrix will show some of the reasons behind the downsizings and deskilling. An effects matrix will examine how speed, cost and quality were affected by the downsizings.

Other data display techniques were also employed in showing the factors involved in Power, Literacy and Downsizing. I used map-making in my analysis and representation of data, a technique encouraged by Odell and Doheny-Farina (1985), Miles and Huberman

(1994) and Sullivan and Porter (1995) to illustrate physical, social and political geographies which shape discourse creation. I also used simple tables to show data.

RELATIONSHIP WITH COMPANY

My relationship with the company, which is naturally very important in this ethnographic study, is as a former consultant who is on good terms with the company and its key personnel. In the summer of 1994, I was hired to work on their catalog and a modem manual. I worked under the marketing director and collaborated with the graphic designer, software manager, and engineers, building up a degree of trust. This trust later helped remove suspicions about my intentions for conducting the research, which can create problems in some studies (Hammerley & Atkinson 1995, p. 80). My good relationship with the company also minimized access problems common in studies such as this (Hammersley & Atkinson, 1995, p. 55), as I was able to use many documents that might have otherwise been restricted. On the other hand, this comfort level raised a different problem, which Hammersley & Atkinson address: "Participants sometimes come to expect the provision of services, and it may be costly to disappoint them" (p. 89). When approached about making HTML files, I declined.

DATA COLLECTION PHASES/TIMELINE

This data collection was divided into several parts. The first part, which helped me gain a rich understanding of the history of document production at the company and the electronic distribution methods used at other companies, took place in the first year of the study (February 1995-February 1996), after which sufficient information was gathered and written up and more data collection methods were devised. This initial background information was crucial in gaining a rich understanding of the company's history of document production and distribution, and history which has shaped current and future electronic distribution methods. The survey, interviews and company

company documents helped provide important information on the customers and the company.

After the August 1996 survey, the research concentrated on the slow process to moving online. Unfortunately, continued changes in personnel and company ownership prevented the company from establishing a Web presence as soon as the company and this researcher would have liked. After numerous options were considered, the company decided to have its page attached to the page of another branch of the company, which was put up in February of 1997.

The final phase of the research dealt with the company's decision to establish its own web site, which became operational in the summer of 1997. The research in this final phase concentrated on the decisions going into the establishment of the Web page, the documents placed on the Web, and who produced these HTML documents, and why no documentation or catalog materials had been placed on the web site.

The study was concluded in July of 1997. One reason for ceasing data collection at the site was my employment in another state. But, while I could have still collected data via email, "snail mail," occasional visits and phone calls, I felt that two-and-a-half years was sufficient time for undertaking a study. While my study was not as long as others (Smart 1993, 1998; Heath, 1983). It was longer than the six months to a year guidelines espoused by Odell and Doheny-Farina. And, many studies last only a few weeks (Murray 1985), others last a few months (Cross 1993), and many others last shorter than a year because of the limits of time and money and the decreased usefulness after a year of study. Indeed, the perceived usefulness of another six months of study was not promising; the product manager who worked with the marketing director predicted that the most recent merger would delay any web site decisions for at least another six months, and that it would likely be even longer before any documents might be placed on the web, perhaps several years. I am glad that I heeded Spilka's 1993 call to conduct research at an organization for more than one year, because the situation did indeed "require negotiations over several years or more" (216), but for the sake of this study, two and a half years was enough.

Throughout all of the stages, the study also was focused on the role of technology at the company, and how technology affected how work was completed and who produced and distributed documents to the customers.

ROLE AS PARTICIPANT-OBSERVER

I did not take a completely detached role in this study, however. In the summer and fall of 1995, I helped produce a 100-page manual for a new product. Because the company initially seemed reluctant to have me conduct the study when I first approached the marketing director in 1995 (with the salaried personnel being cut by one-third, there was a concern about the amount of time they would need to dedicate toward my research), I volunteered to exchange one hour of free consulting time for every hour spent with an employee conducting research (in interviews, surveys, etc.). Over 100 "exchange" hours were built up in the summer and early fall of 1995. After that point, I did not work for the company and moved out of my temporary office. I recommended a replacement, a fellow technical writing teacher at Purdue, who later revised the manual I wrote and created other documentation.

So, for the first part of the study I was a participant observer (Odell and Doheny-Farina, 1985), taking field notes, conducting interviews and collecting documents. For the last two years of the study I was more of an outsider who conducted interviews and worked with creating and distributing the survey, trying as little as possible to disturb the culture I was studying (Sullivan and Spilka, 1992). By not becoming an active participant in the process, I was able to have the advantages of being a participant and understanding the culture better, while still being in a more objective position for the bulk of the study and thus not "going native," becoming a member of the same culture (Faigley 1985, p. 246). Likewise, by resisting the urge to take a proactive stance and help the company move to electronic publishing, I was able to avoid the "researcher as missionary" trap, along with the "researcher as apologist" and "researcher as sympathizer" roles outlined by Doheny-Farina (1993). In fact, I was originally approached to help out with the move

to electronic publishing. They knew I had experience with the World Wide Web and with creating documents for the web, and asked if I would be able to help them. At first, I was torn, in part because doing the electronic publishing consulting work and web page development could have been very lucrative (especially appealing for an impoverished graduate student!). And, designing a company web site would have also been an excellent item to put on a *curriculum vitae* and a good stepping stone to a number of different future jobs. In addition, I also felt an ethical responsibility to both the customers and the company. I felt that the lack of knowledge and expertise about electronic publishing would lead to decisions which would be ultimately damaging to the company, to its workers and to the customers. In short, I felt the ethical need to "care for others" which Sullivan and Porter elaborate on in their chapter on "The Politics and Ethics of Studying Writing with Computers" within their *Opening Spaces* book.

However, I chose not to take a more active role, for two reasons. First, working so closely with the technological implementation would have tainted the study. In essence, I would have ended up studying the decisions and methods I made and used in creating an electronic publishing system. The need to study myself would have ended up degrading the value of the study, most likely rendering it worthless. The company did indeed have other options for implementing electronic publishing, and if they indeed did make it a priority, they had numerous options available to them (other graduate students, a full-time technical writer, hiring back the graphic designer, hiring an outside consultant) that would not have required a great deal of effort.

Second, my ethical incentive to help was also suspect. Sullivan and Porter (1997) warn of the problems with the "assumption of liberal superiority: the 'good' missionary who brings truth and salvation to the ignorant natives" (125). And indeed, that is what I would have ended up doing, no? I would have been bringing my knowledge and presuppositions about what the company needed in order to best help the people whom I thought needed help. Such a stance smacks of haughtiness, of hubris. And, even if my assistance did prove beneficial to the customers and the company, what of my ethical responsibility to the workers who were laid off? If I was successful in implementing an electronic publishing system, I would be guaranteeing that these terminated people would

never be hired back (the company had a history of going back and forth during good and bad times in the hiring and firing of people related to document production and distribution). In any case, I would have been little more than a "scab," a lower-level replacement worker hired with lower pay and benefits to perform the tasks of previous workers. Not a very ethically tenable position. So, in the end, while in areas such as the dissemination of survey results I provided information which the owners and management could use and which gave a voice to the oppressed/silenced customers, I refrained from taking a more active role in the decision-making and implementation of the technology.

PLANNED RESEARCH METHODS WHICH WERE NOT ABLE TO BE IMPLEMENTED FULLY

Discourse analysis

In the beginning, I had planned to include discourse analysis as a significant method of data collection/interpretation. I had hoped to compare paper documents with versions placed in electronic form, especially in CD or WWW formats which would have allowed for more hypertext/associational links and multimedia. Such a comparison would have provided rich data about how the company did or did not use the technological capabilities of the media when producing and distributing these documents. Such information would have been able to help answer key research questions and support or undermine theory-based hypotheses concerning the company's views and uses of technology. While the fact that the company did not place any documents in electronic form is very revealing and data-rich in itself (see Chapter 4), the absence of documents to compare did prevent me from using this method to its fullest.

As mentioned above, I do compare some documents produced in Pagemaker with other documents produced in Microsoft Word. Instead of looking at hypertext and multimedia issues, I do side-by-side comparisons which focus on the following discourse-based elements (Chapter 3):

- number of graphics
- type and quality of graphics

- placement of graphics on page
- text wrap around graphics
- placement of text blocks
- "Textual graphics" (use of drop caps, fonts, sizings)

Discourse based interviews

Similarly, I had hoped to conduct discourse-based interviews (Doheny-Farina, 1986) to help determine the reasoning behind the differences between online and paper versions of documentation. Given the complexity, length of production time and collaborative nature of producing/converting files for electronic distribution, I chose not to use protocol analysis. I had planned to conduct post-writing interviews with the creators and reviewers of the online documents to gauge why changes from the paper versions were or were not made. Because these electronic versions were not created and because the prospects for creating these documents by 1998 were thin, I did not use discourse-based interviews.

Counters

Another research method I wanted to use, the simple counting of documents requested via paper vs electronic means was also rendered useless because of a electronic document distribution system was not implemented. I was going to compare the number of documents requested from the marketing department administrative assistant and a software programmer who handled software document requests with the number of CD, fax, floppy, email or Web page files downloaded. This part of the study was further hindered

Collaboration in data collection, analysis

I took all the notes, collected all the documents and conducted all the interviews and coded the data (my wife was instrumental in transcribing several of the interviews and tabulating surveys, however) . As a result, this study lacks the hypothesis-generating and

methodological insights gained from collaboration with another researcher. This is not unusual, since research in business writing is typically done individually (Rymer 1994). Having another researcher in this project would have yielded more and more diverse data and would have made it easier to compare data coding and have more reliable data coding. Selecting someone at the same graduate school stage and with the same interests to co-author the dissertation would have been difficult, and the risks of "trailblazing" in writing a co-authored dissertation outweighed the collaborative advantages. As far as having another person to analyze data, while Cross (1993) coded his data alone "because the ethnographer is the critical instrument of observation," economic and especially time factors (for myself and any outside raters) largely inhibited me from being able to have others go through page upon page of the data.

RESEARCHER BIASES/IDEOLOGY

Ethnographical research, which is necessarily a product of human subjectivity in the collection, coding, interpreting and presenting of data, is subject to researcher bias (as is quantitative research). Porter and Sullivan (1993) argue that "there is no such thing as pure, unadulterated observation. Observation always proceeds with some hypothesis in mind, however well-or ill-informed it may be" (224). Hammersley and Atkinson (1995) note that there has been a recent trend for researchers to focus less on trying to appear neutral and instead conduct more "openly ideological" research (14). Lauer and Asher (1988) also recommend such disclosure: "Also important to discuss will be the perspectives that the researcher brought to the environment" (42). I agree that it is important for readers to have a clear understanding of the researcher's ideological framework so that they may do their own interpretations of the interpretations of the researcher and be able to come to new conclusions or discount some of the data or findings of the researcher.

In that spirit I wish to freely acknowledge that as a technical writer and teacher of technical writing, I understandably have some biases concerning the role of writing and

technical documentation in a business setting. While engineers and software developers may downplay the role of writing, I may overemphasize its role in the success of the company and its products and services. Having done technical writing at the company, I also may have another bias: before I began the study I felt that a full-time technical writer with a strong graphics background is needed at a technologically-rich company (see comments in Chapter 5), because of the complexity of the products and the learning curve involved in understanding the field and industry well enough to compose technical documentation. Finally, as a teacher and advocate of writing-related technology, I cannot be fully neutral about the use of this technology. I do not have an uncritical affection for the hardware, software and networks, but I have used the technology and seen its potential for creating and distributing effective documents, and thus typically see more conservative approaches toward the use of the technology in a negative light.

LIMITATIONS AND BIASES IN THE DISSERTATION

As I mentioned earlier in this chapter, while this dissertation is not a "confessional" tale, although it would contain a confessional portion. Accordingly, this section of the chapter addresses the weaknesses and biases in my data collection and interpretation.

The ethnographic nature of the studies limits its transferability

Because of the very nature of my methodology, one must be very careful in trying to transfer any of my findings or conclusions to other environments. By its very nature, ethnography is the study of one culture, and this dissertation as such is the study of the customer-company culture surrounding a plant in Indiana. The people, history, relationships, priorities, and traditions are not identical to any other culture, and thus conclusions reached about this culture cannot be blindly assumed to be the case at other cultures, even if they bear similarities. While a meta-analysis of many studies such as this or a multi-site case study may yield results which from which generalizations could be

made, the results of this ethnography cannot be universally applied to other cultures, even similar ones within the same industry.

Site studied is not typical of many environments

Even within the same industry, the culture studied has many unique characteristics. For one, the company was bought out twice during the time period of the study, as opposed to the other companies which retained their ownership. This change in ownership created many unique obstacles in the company's quest to move to electronic publishing. In addition, the branch structure and foreign ownership was unique to the company. The company was at the mercy of that ownership and the other branches when it tried to undertake some of its goals; its failure to reach those goals was in part due to the structure of the company. The size and diversity of the company was also a factor—other competitors were much larger (General Electric, Slumberger and ABB/Westinghouse) and had a much different hierarchy and range of products and services. Similarly, the financial situation and restrictions at the other companies was not identical to the one being studied. These differences are just with the competitors; generalizing the findings to another industry would be even more problematic, since the customers, products, design/production methods and documentation/document needs would be significantly different.

What is also unique about this company's situation is that they were using electronic publishing as part of a downsizing measure instead of an upgrading benefit. Many companies move to electronic publishing to better serve their customers. Companies place their documentation and software upgrades and patches on the WWW as a means to provide increased service to customers. In fact, in the software industry such availability is *expected.* Someone buying a used printer on eBay can pretty much assume the printer driver for his/her operating system will be on the company's website, perhaps along with specs and documentation. While no doubt this online availability saves the company money, one of the main reasons for the software/documentation presence on the web is to meet customer expectations. It is an upgrading move, and a

supplement to paper documentation sent with the product. With the company being studied, the move to electronic publishing was seen as a means for allowing downsizing. The primary motivation wasn't to best serve customers, but to merely survive. And, given the preferences many indicated on the survey for paper copies, the move to only supply online versions of documentation would actually be a *downgrading*, not an upgrading.

Finally, the situation for this company is unique because of the industry it caters to. Many of the employees in the utility industry which would be using their meters only have a high school education or less. And, as evidenced by the survey, many of them do not have the latest in technology, and are not nearly as likely to be hooked up to the internet as in some other industries, such as telecommunications or computer hardware/software. For these reasons, it is easy to understand why many customers would prefer copies and why the move to having only online versions would be a major obstacle to them.

Biases

Former employee

One clear bias that I had entering the study is that I was not truly an independent outsider. I worked at the company on a part time basis for several months as a technical writer. This affiliation had several advantages, but had disadvantages as well. One advantage, of course, is that I was more familiar with the environment and had a better idea of what I was looking for. My previous relationship with the workers at the company also helped me establish a degree of trust, which was very helpful when collecting data, especially interviews. That relationship also resulted in the company's approval to conduct a survey of customers, which was very important to my study. However, because of my previous affiliation with the company, there was the concern that I had "gone native," to use a term from sociology. But, all told I worked only about 200-300 hours for the company, and I was hired on a consultant basis. Of more concern, perhaps, is my affinity toward the people who were laid off. I had worked fairly closely

with the graphic designer on some projects, and naturally was disappointed for him that he was laid off after approximately 15 years working for the company. I also felt feelings of betrayal, as I did some of the work he used to do in my role as consultant for a short period of time. I also felt affinity for the marketing personnel who were not laid off and who were overburdened with work as they picked up the tasks of those laid off. Consequently, my feelings for these people had at least a subconscious effect on my data collection (for example, the questions and the wording of the questions asked during interviews), both in terms of what I chose to collect and data I might have overlooked had I not been affiliated with the company.

Technical writing specialist biases

My background as both a teacher and a practitioner of technical and professional writing also biased my data collection and interpretation. I have been involved in technical writing as early as 1989, when I worked for the Illinois Secretary of State Office and as a professional writing teacher since 1992, having taught business writing, technical writing, introductory newswriting and online journalism at Purdue and technical writing, introductory newswriting, copy editing, advanced desktop publishing and multimedia authoring at Missouri Western State College. In addition, I have a secondary field in professional communication at Purdue. This dozen-plus years in professional communication as a student, teacher and writer has naturally caused me see the value of technical writers and to deem them as very important people in the workplace environment. Understandably, this background may have biased my conclusions about how a full-time technical communicator and graphic artist could have saved the company money and helped the company achieve its goal of moving to electronic publishing.

Limitations

Inability to analyze electronic publishing system

One of the main limitations of the study was that I was not able to analyze electronic documentation. I had hoped to conduct a discourse analysis and discourse based interviews which examined the intersections of document production and distribution. In other words, I planned to examine how documents were altered to fit on the electronic medium—what changes were made in the omission/inclusion of graphics? Color? Sound/video? Screen views? Printable versions? Size of files? Association between products? Other hypertext links? Organization/linear format? Relationship between marketing and technical support? Also, what medium was chosen? Why? Who produced and who distributed the electronic and paper versions? The answers to these questions would likely have been very interesting and useful to the study; however, the company failed to produce electronic versions of its documentation for distribution, making such analysis impossible. While the examination of the reasons for this failure yielded interesting and useful information, the failure did represent a limitation of this study.

Survey response

Another limitation, another caveat when looking at the results of the study was the limited response rate in the customer survey. Only 87 of the 450 customers responded to the survey, a 20% response rate. Naturally, a higher response rate would have made the results more reliable and a better reflection of the 2,000 customers of the company. The low response rate is especially problematic because those responding may have had a vested interest in responding, and those not responding may have had a vested interest in not responding. Let me explain. The people who had internet access and advanced computer capabilities may have benefited from a move to electronic publishing, and therefore may have wanted to respond in hopes that the results would reveal a need

to move toward electronic publishing. And, computer "gurus" seeing the questionnaire may have had a natural interest in answering questions relating to technology.

Those who didn't respond may have felt that the company was trying to keep an eye on them, and may have felt embarrassed about their antiquated computer equipment, and thus thought it best not to respond. In addition, some of the terminology and questions may have intimidated those without advanced computer equipment or knowledge. Given these factors, one may logically guess that the survey results were skewed toward the higher end of technological capabilities. So, in reality, customers may have been less likely to have CDs, internet access and email accounts, and may have been more likely to want to have paper copies of documentation.

Access to documents

While I was given permission to survey customers and to view many documents produced by the company, there were some restrictions on my access. For one, I was not able to obtain data on the exact amount consultants were paid. Because such information crossed over into personnel/human resource issues, I was not able to find out exact numbers on how much each consultant was paid, forcing me to rely on second-hand information from interviews with consultants and other company personnel. In addition, I was also not privy to documents which related to other branches. And, since the Illinois branch spearheaded the efforts in designing the website, I was not able to obtain some key information. Likewise, I was not informed of some key meetings until after the fact; had I been informed beforehand about some of the most important meetings about the planned purpose of the website, I might have been able to get more information.

CHAPTER 3: THE CULTURE AND HISTORY OF DOCUMENT PRODUCTION AND DISTRIBUTION

In Chapter One, I used Feenberg's four-part breakdown of the influencing factors on technological implementation: ownership/management, technical elite/workers, customers/users and culture. In that chapter I discussed how ownership/management has traditionally dictated how technology was used, but how, given the right culture and a technical elite and worker/user/customer with the knowledge and interest to make change, a more democratic means of technological implementation could result. So, in this chapter, I describe those four groups/aspects—ownership and management, technical elite, customers and culture. I begin with culture, providing the reader with an overview of the company, the industry, the products, means for designing, producing and marketing the products, the work environment, and the relationships among the groups involved with the company and its products. The second part deals with the groups involved, the company ownership and upper level management, the technical elite (primarily in relation to document production and distribution processes), and the customers, a group which includes the distributors, the utility companies and the actual users of the products, the people who install and read the meters. The third section contains a history of document production and distribution, since those functions are the focus of the dissertation. This section maps the changes in personnel/organizational charts.

While much of this information is useful in and of itself, the primary goal of this chapter is to help the reader become familiar with the entire milieu. This familiarity is necessary to understand these groups' relationship to issues of power, literacy and downsizing/deskilling presented in Chapter 4.

OVERVIEW OF COMPANY AND PRODUCTS

Global organization

As mentioned in the previous chapter, the factory produces electric meters (which determine household and commercial electric bills) for the utility industry. The company used to be an independent, locally-owned firm until 1976, when it was bought by a European concern. Part of that European company's holdings included three other branches in the United States which dealt with other parts of the electric industry. Total revenue in 1995 was $2.89 billion. This is what the company organized looked like in February of 1995, when the study began:

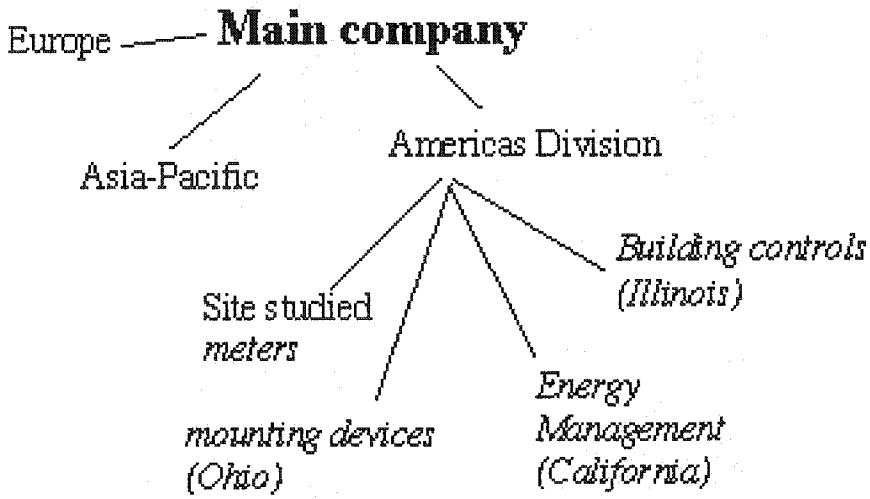

Figure 3.1 Worldwide Organization of Company 1994

Then in 1995, the company was bought by another firm which specialized in electric industry products as well. Actually, the firm was a holding company owned by a large Swiss bank, which in 1997 chose to focus on its core banking business. The company was thus sold again, this time to a huge German engineering firm. That firm had a plant in North Carolina which produced high-end meters. During these two years, another facility was built in Mexico to produce the residential, low-end meters. A scaled down version of the company looked like this:

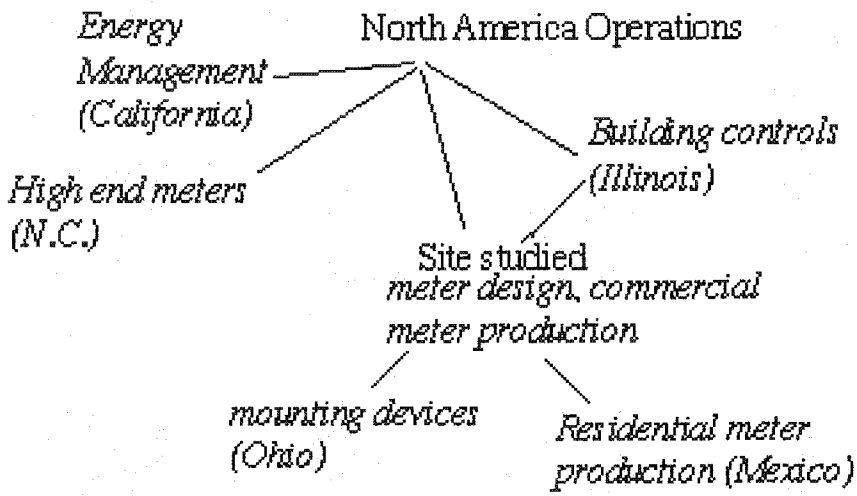

Figure 3.2 North American Organization of Company 1997

As one can see, the mounting devices and residential meter plants fell largely under the auspices of the plant being studied. At the same time, the Building Controls division was arranged such that they had more power over the site being studied, especially in terms of the webpage.

These mergers and buyouts had a huge influence on the plans to distribute the documents electronically. For one, the change in ownership forced the company to delay plans to build a website. The marketing department officials couldn't build the site immediately because they didn't know if the company name would be changed or if they would need to follow certain visual guidelines of the new firm. They also didn't know whether they could establish a site for the metering division separately or whether the metering site would need to be a nested section inside of the main company's big website. And, there was a question of where funding would come from. These concerns were huge. Given that the personnel was already overexpended after downsizings (see below) and that the company was already deep in the red, no one wanted to dedicate the time and monetary and personnel costs necessary to establish a webpage which might need to be completely revamped three months later. In a similar vein, the company mergers and subsequent reorganizations were taxing on an individual level. In many cases, people

were placed into new positions and given new responsibilities, and the learning curve involved in this transition consumed their time, energy and ambition. There were new tasks to learn, new people to know and scores of new meetings to attend during this time of change. Putting up a webpage was placed low on the priority list.

It is important to remember that the two buyouts occurred within about 18 months. That meant that the time between becoming adjusted to the new company (perhaps six months) and the time when the rumors of a new buyout were floating left little time to focus on a webpage.

Site organization

At the beginning of the study, the factory employed about 500 people, which included three shifts of assembly workers, in addition to personnel in engineering, marketing, purchasing and accounting departments. While the factory is a branch of a larger company, most everything is done independently of the other branches. The products are designed by engineers at the site, who work with the software developers and production personnel. The marketing department handles product support and produces and distributes promotional material. The technical documentation is written by engineers in collaboration with marketing personnel and consultants. A plant manager oversees the operations. Under him in 1995 were heads of marketing, engineering, accounting and production.

Company health

The electric metering industry, like many manufacturing areas, has become increasingly competitive. Profit margins have decreased, and the company's market share has also been cut in about half. The Midwestern branch studied has operated at a loss almost every quarter in the first half of the 1990s and lost millions in that time. In order to counter these losses, the workforce was cut by nearly one-half. This has not only occurred on the factory line, but also in every other department, including engineering, software and marketing.

The company especially lost money in its manufacture of basic residential meters (the meters attached to houses to determine monthly electric bills). Competition in this product line was fierce, driving per-meter prices very low. In spite of a redesign and new efficient production line for this meter, the company was still losing money on each meter made. Ownership/management decided the solution to the problem was to reduce labor costs. With the passage of the North America Free Trade Agreement, the company joined many other firms in moving production facilities south to Mexico. This allowed the company to lay off many employees, leaving a much smaller force to produce the more complex and higher profit meters used at retail, industrial and other commercial businesses. These meters can not only handle more electricity, they are also designed with hardware and software to help the businesses and the utility companies monitor electric use (some of the meters enable this monitoring in real time, remotely via a modem) in order to both bill usage during peak and low usage times and help reduce electric costs. For example, a person at a manufacturing facility can see when the most electricity is being used and choose to shut down non-essential operations temporarily in order to prevent having to pay premium kilowatt rates which are charged during certain times or when usage reaches certain levels (billing is much more complex for commercial operations). Naturally, these more complex meters need good documentation and customer support, more so than a basic residential, sometimes analog device.

THE KEY PLAYERS: OWNERSHIP/MANAGEMENT, TECHNICAL ELITE AND CUSTOMERS

Ownership/Management

In this group I place the European ownership, the plant manager and the head of the marketing department. The board of directors and the executive officers for the European parent firm(s) obviously have the most power. But, because of the size of the company and the physical distance between the site studied and its ownership, the responsibility for the day-to-day operations rest with the plant manager. The plant manager had been at his position about three years when the dissertation was started. He

was an American who replaced a European. Especially after a string of losing quarters, he was under great pressure to cut costs and begin making a profit. It was his decision to begin layoffs. In making those layoffs, he looked to cut the parts of the company which were not physically making a profit. Thus, the print shop—while it may have been saving money—was one of the first sections to go.

I include the marketing head in this ownership/management category as well, although in truth the position was more of a halfway point between ownership/management and technical elite. On one hand, the marketing head was a member of the management team and yielded great power when it came to making decisions regarding document production and distribution. He chose who to write and design the documentation and promotional materials and how they were going to be printed. On the other hand, he was very much at the mercy of the plant manager and the Building Controls division when it came to the decision to move to electronic publishing. He did not make that decision, but was told to implement it. And, he did some writing and was very much involved in writing and working with consultants in producing the key documents, making him a part of the technical elite.

Actually, there were two different marketing directors during the two and a half years of this dissertation study, as one was demoted to head of mounting devices about a year into the study. Both men came from an engineering background. Their education was in engineering and they began their careers in engineering and were promoted/moved to the marketing department. Consequently, they both had to learn about both management and marketing skills in their new positions. Their background allowed them to be very familiar with the workings of the company's products and customer-related questions and problems with those products. Quite often they seemed torn between cutting costs, getting products and documents out the door quickly and at the same time providing good customer service. They both had good computer skills, but in 1995-96, they had very limited knowledge of page layout software and design principles and had only done some limited surfing of the web. They did not have web connections at their desks until midway through 1996. They were very familiar with Microsoft Word and Excel, but not other page layout programs. In short, they did not have the technical literacy in the area

of electronic document production and distribution needed to move the company in this direction (this will be detailed more in Chapter 4).

Technical Elite

There are three main groups in this category: engineers, software developers and marketing/product specialists. I will focus on their position as technical elite as it relates to document production and distribution. The first group, engineers, naturally came from a very scientific and technical background. Some them were mechanical engineers and worked with the mechanical aspects of either the meter or the manufacturing equipment. Others were electrical engineers and working with designing the meters and their electrical components. Still others were computer engineers and focused on the hardware, firmware and software involved in the operation of the more complex meters. All of these engineers were male, with most in their thirties and forties and had been with the company 5-10 years. Not surprisingly, most all had good computer backgrounds and computers (486s) on their desks. They helped write some of the documentation, and were definitely involved in writing the proposals and specs for new meters—documents which were often adapted into the documentation for the products. Their writing skills were mixed. Most tended to write in hyper-formal English. Several engineers were laid off in 1995, and several others left the company between 1995-1997, in part because of concern that they would be the next to go in a future round of layoffs. Morale, while not terribly low, was not high either because of the job cuts.

The second group, software experts, designed the software for accessing and viewing and organizing the data from meters. There were essentially three main software people, but one of these people was laid off and another one left the company to take another job in 1996. Their computer skills were excellent, of course, and their writing skills were surprisingly good. They were very, very proficient with Word and produced remarkably complex and well-laid out documents in Word. They were e-mail junkies and had begun working with web technology in 1995 and 1996. The software manager had created a home page and had actually placed some software patches for download from his personal America Online account. He also hired and supervised an intern who created

a bulletin board-type system for accessing (mainly through ftp methods) computer patches and documentation in Word. That system was not advertised because it did not end up meeting quality standards in terms of image and appearance. It should be said that much of the time spent by the software experts was on customer support. They would handle all of the incoming calls from customers who were having problems installing or using the software—a burden which would often consume more than half of their day.

The last group, the product specialists, were housed in the marketing department and also spent much of their day fielding calls from customers about other aspects of the meters. They were also responsible for working with development of products, going to trade shows, helping with the company's metering school, visiting customers and in writing manuals and promotional materials. These product specialists were virtually all previously engineers. They had fair writing skills (some better than others) and moderate level computer skills and proficiency with Microsoft Word. They were not very familiar with the web in 1995-96. All of these people, like the software and engineering people, had at least a bachelor's degree while some had a master's.

Sales/Distributors

The sales force was also in the marketing department, and was comprised of a mix of people, ranging from past engineers to former utility workers. Some had college degrees, while some only had high school degrees or associates degrees. One was bilingual in Spanish and worked with Latin and South American clients. Most carried laptops with them and were proficient in Word and Powerpoint. These people were on the road most of the time and on the phone when they were in the office.

As described in Chapter 2, the distributors are outlets which, not surprisingly, distribute the company's products. So, if Scott County Rural Electric Association needs to order 500 residential meters, they go through the distributor to get their meters. There are approximately 50 distributors. Large states like California and Texas have multiple distributors, while for smaller regions and smaller population areas, one distributor may serve several states. Their computer skills and access and internet connections ranged widely, but the bulk had good computers with CD-ROMs and internet access.

Customers

Companies

The industry is made up of two main groups: investor-owned utilities (IOUs) and municipal or rural electric associations, cooperatives and companies. There are approximately 200 IOUs throughout the country, but 3,300 municipal and rural electric companies, including 2,000 of which were customers of the company being studied. The IOUs are typically very large, with millions and millions (or even billions) in revenue and expenses. Because of their large revenues and the money that has been invested in them (typically they are publicly traded companies, listed on the New York Stock Exchange, American Stock Exchange or the NASDAQ), they often have large investments of their own in technology. They also privilege technology because they need technology in order to serve a large customer base efficiently. Translation: IOUs' money and value systems mean that the companies are more likely to put updated equipment on their workers' desks and to have hired and trained these workers to use current technology. The rural and municipal electric companies are typically much smaller, serving only a few thousand or a few tens of thousands of customers. Their budgets are often tighter and they usually cannot afford the people and machine costs of higher technology. Quite often, they also do not need this level of technology to serve their customers acceptably. For example, a large IOU may find it efficient and necessary to provide real-time, internet-based billing to its huge manufacturing clients. On the other end of the spectrum a rural electric cooperative, serving primarily residential customers and not having man large industrial clients, would not have the need nor the dollars to design or implement such a complex system.

This industry culture has two important ramifications as it relates to the company's decision to move to electronic publishing. The most obvious consequence is that the workers at the IOUs are more likely to have Pentium computers, modems and a WWW connection. At the very least, the person who manages the electric meter installation personnel would be able to download an installation guide or other document via email or the World Wide Web. The rural electric company may not have any computer

accessible to the meter installation personnel (or may have only had a 286 or 386) and may not have anyone at the entire company who either has an internet connection or the technical know-how to download a document. So, these two groups would naturally have differing degrees of welcome to a switch to electronic publishing. The IOU may embrace the change, since they would no longer need to wait several days for a document to be shipped from the company. Instead, they could simply download it and print it off and give it to the installation personnel. Or, better yet, a worker in the field with a laptop, realizing he (a vast majority of these people are male) did not have the necessary document, could immediately download the document with the necessary information or electronic schematics and view the document electronically on site, saving valuable time for the company and its customer. The municipal/rural company, on the other hand, would be currently unable to access the documents and would need to spend money to purchase the necessary computer modem, and internet connection—as well as a printer with a high enough quality and speed-- and spend the time to train at least one of its workers in how to download and print documents. So, the large IOUs would largely benefit from the change to electronic publishing and the rural and municipal companies would not want the change. So, the company might have been able to assume tacit approval from the IOUs to switch to electronic publishing, but knew it would not be providing "outstanding customer value" to its municipal and rural electric customers.

Individuals

The individuals at these companies likewise had varying backgrounds depending on their company and their position. In many cases, the person using the meter and the documentation either worked in the meter shop or in the field (or both) at the company. Most all workers were male, and a large percentage of them probably did not have beyond a high school education, although in many cases, especially at the larger companies, the person may have had an associates, advanced training or a bachelor's degree in electrical engineering. The computer skills and access were also varied, as some meter shops would

not have a computer or only a 386, while others might have multiple computers and Pentiums with internet access and laptops for work in the field.

HISTORY OF DOWNSIZING AND DOCUMENT PRODUCTION/DISTRIBUTION 1971-1997.

Through interviews and analysis of company documents and organizational charts, this section investigates the company and its past and current methods of document production and distribution, mapping the various workforce reductions. In addition, this part of the chapter ties in these changes with technological advancements, showing how new computer technologies made downsizing possible. The section begins with the emergence and growth in document-related personnel between 1971 and 1991 and then outlines the decline in those personnel in the subsequent six years.

Part I: The Building of an Internal Publishing System: Document Production and Distribution 1971-1991

Overview

The method and personnel involved in document production and distribution in the company changed drastically in these 20 years, which is well documented in the 1971-1990 organizational charts. When these charts were first kept in October 1, 1971, there were five main areas within the company: marketing, engineering, manufacturing, accounting, and the factory.

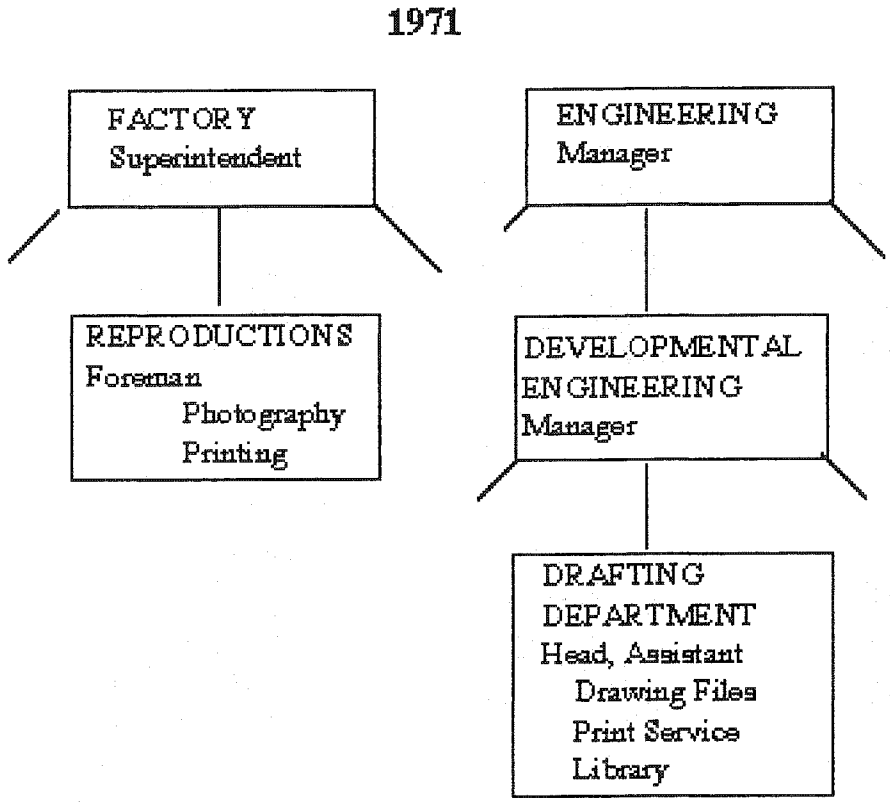

Figure 3.3 Document production 1971

Mention of document production and distribution personnel was minimal; Two people in Engineering were listed under the Drafting Department, whose tasks included "Drawing Files, Print Service, Library," and one person in the Factory area was listed as a Foreman of Reproductions, which included "Photography, Printing." No one is listed as a technical writer, and it would be logical to assume that some of the 16 developmental engineers were responsible for writing their own documentation. They might have received some help from personnel in Marketing, although the limited number of personnel in that department (three managers [metering products, mounting devices and specialty products], two customer service representatives and a manager of Marketing and a manager of the sales office) probably prevented the engineers from receiving much assistance. One of the job duties for the Manager of the Sales Office listed in the

organizational chart is "Customer Cataloging and Mailing," which might have included sending not only the catalog, but also documentation, promotional material.

By July of 1973, the organizational chart for document production and distribution had changed drastically.

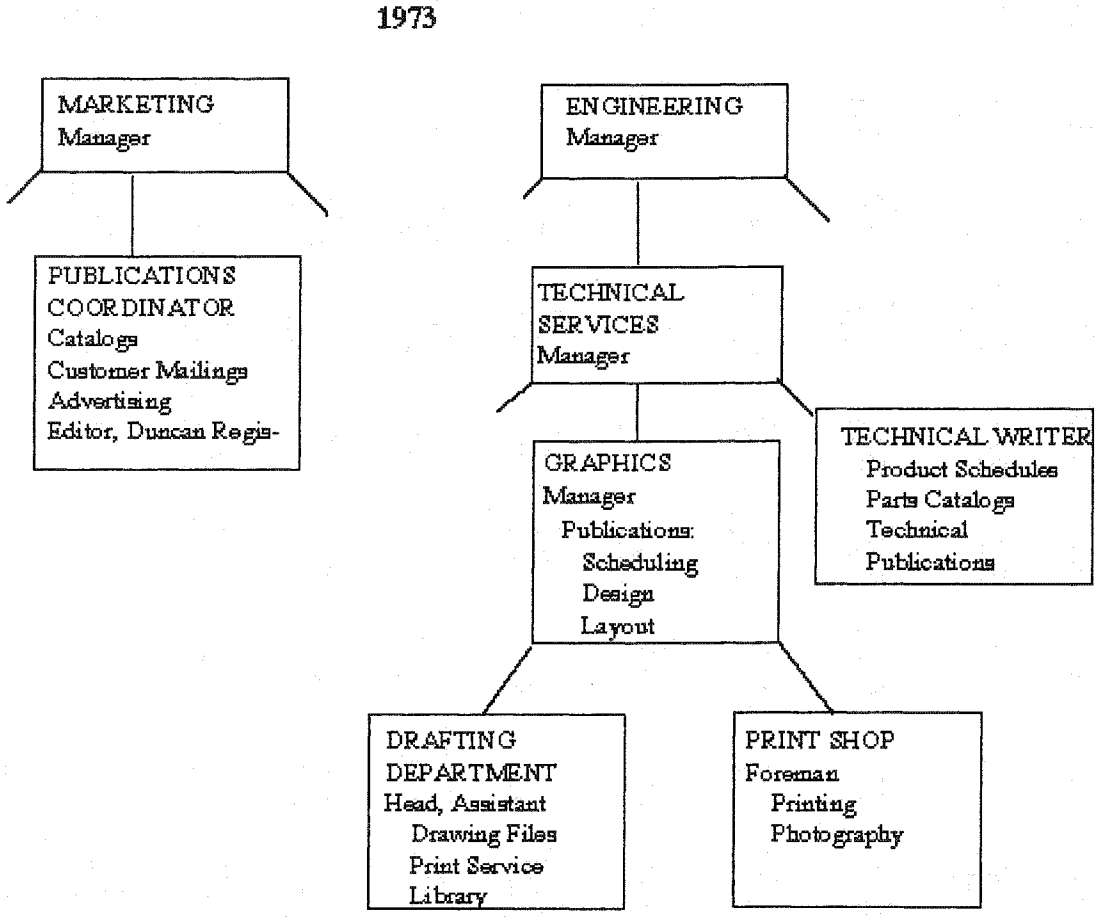

Figure 3.4 Document production 1973

A new position in Engineering, Graphics Manager, was added, whose job duties were listed as "Publications: Scheduling, Design, Layout." This person (the previous head of the drafting department) supervised the Drafting Department (which still contained two people) and the Print Shop. The Print Shop--previously listed as Reproductions and under the Factory area--retained the same foreman and the same listing of responsibilities. For the first time, a Technical Writer position was also added. This new person (not listed anywhere on the 1972 org chart) reported to the Manager of Technical Services (as

did the Graphics Manager) and was in charge of "Product Schedules, Parts Catalogs, Technical Publications." This new emphasis on documents in the organizational chart was extended to Marketing, as well, where a new position of Publications Coordinator was added. This new person, who was one of five new people added to Marketing since the June 1972 org chart, was responsible for "Catalogs, Customer Mailing, Advertising" and editor of the company newsletter. So, in the space of a year the publications personnel became consolidated and added three new people to their ranks.

Changes were limited over the next few years, but gradually indicated a decline in publications personnel. In 1976, a new person filled the Publications Coordinator position, and an additional company publication, news releases and complaint reports were added to the expectations for this position. In Sept. 1978, the position of Technical Writer was still present, but no name was listed. In addition, both the Publications Coordinator position and the person previously filling that position were not listed on the 1978 chart.. A Sales Promotion Coordinator position was added, however, which could have subsumed some of the Publication Coordinator tasks.

The 1979 chart shows that the technical writer position was eliminated, and the person in that position previously was listed as a programmer that year. There was also a change in the person named as Print Shop Foreperson (note name change from Foreman) . Seven new positions were added to the organizational chart which were involved in the publications process (these people could have been employed by the company before in hourly positions or simply not listed on the organizational chart, however).

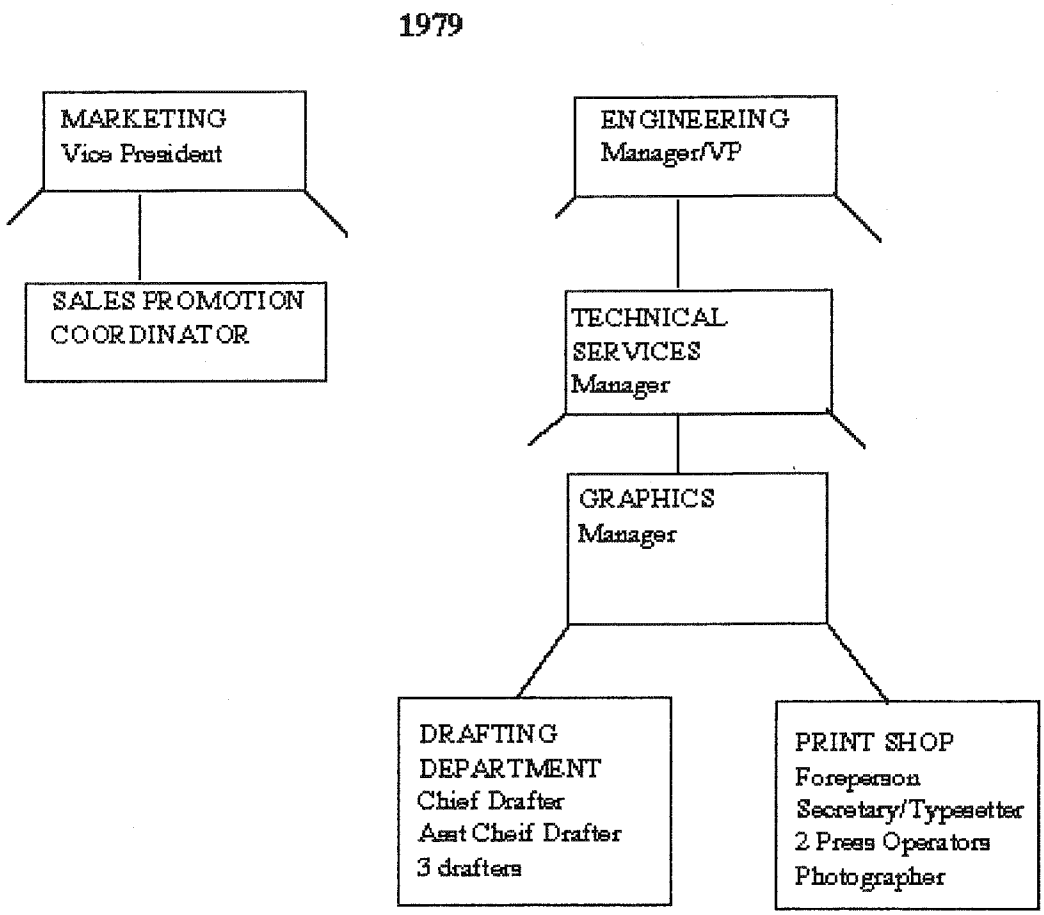

Figure 3.5 Document production 1979

The additional positions were Secretary /Typesetter, two Press Operators, a Photographer and three new Drafters. All of these people were still listed under the supervision of the Manager of Graphics.

In October 1980, the Sales Promotion Coordinator position and the person filling the position were no longer listed on the organizational chart. A new position, Sales Correspondent, which again might have been involved in publications distribution, was added. The photographer position was still on the chart, but it was held by the person who was still listed as the Print Shop Foreperson. One drafting position was also eliminated. By January 1982 the photographer position was eliminated, but a drafter was

added back on the rolls. In October of that year, one of the first big round of layoffs began (Miller), and one of the people terminated was a pressman ("Number" memo).

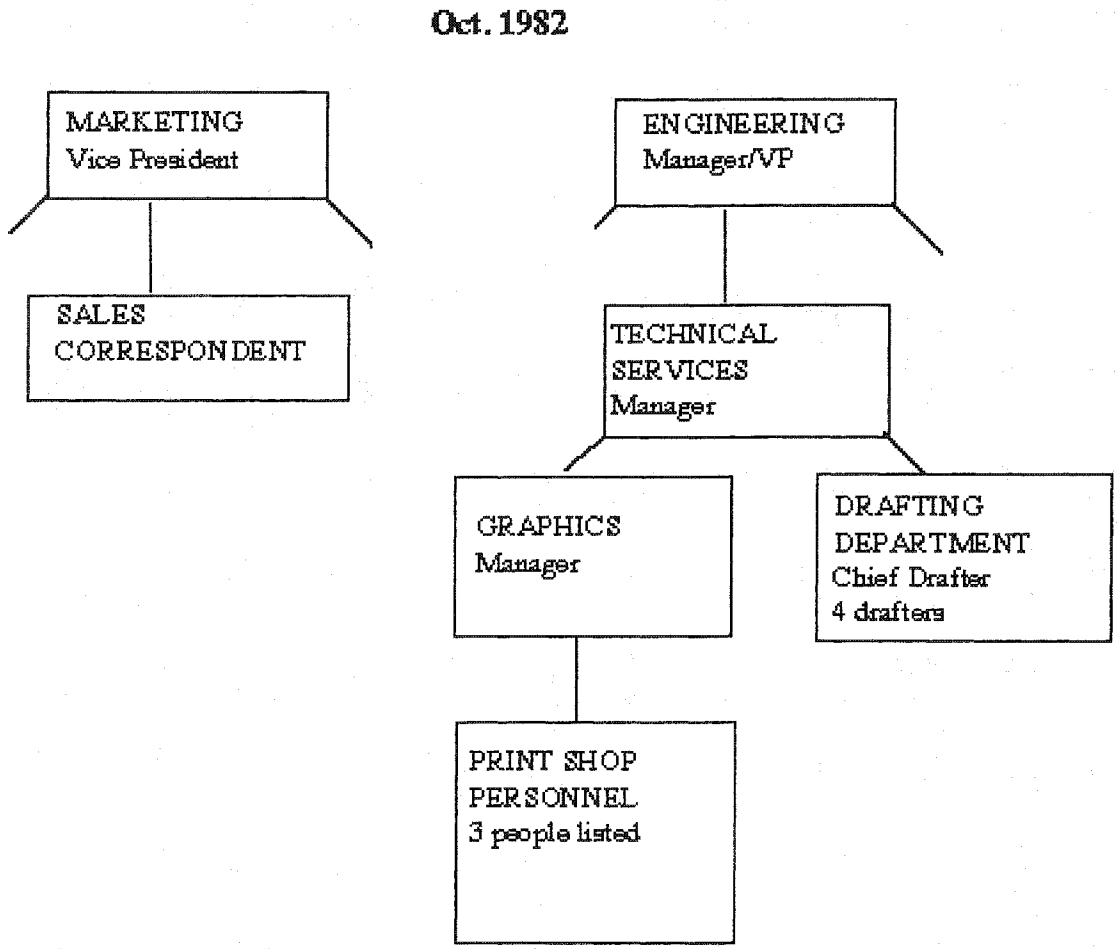

Figure 3.6 Document production 1982

A reorganization also occurred, as the Drafting Department was no longer placed under the Manager of Graphics, but was instead put on an equal level and also reported to the Manager of Technical Services. The Print Shop Foreman and Assistant Chief Drafter no longer retained these titles, but instead were just listed under "Print Shop Personnel" and "Drafters."

In 1984, the Sales Correspondent position became "Sales Correspondent/Literature Coordinator" and was held by the same person who was in the Sales Correspondent position since its inception. In October 1985, the position became

just Literature Coordinator, and one other person was added to the "Graphics Department Personnel" listing (the name Print Shop Personnel changed in 1984). A new position, Videographer, was added in 1986 and placed in the Marketing department, and reported to the Manager of distribution and promotion, just as the literature coordinator did. Two new drafters were also added in 1986, bringing the number of drafters to seven.

The Oct. 1988 chart lists 10 total drafters, four of whom were in a CADD section. The April 1989 chart shows a significant change in Engineering, as the Drafting Department and its 10 members became six people under the title "Engineering Services Personnel." The number of people under the Graphics Manager was reduced from four to three. By October of that year, the position of Foreman of Graphics was added, along with another person, a photographer/videographer to that department (the previous videographer who was in the marketing department left).

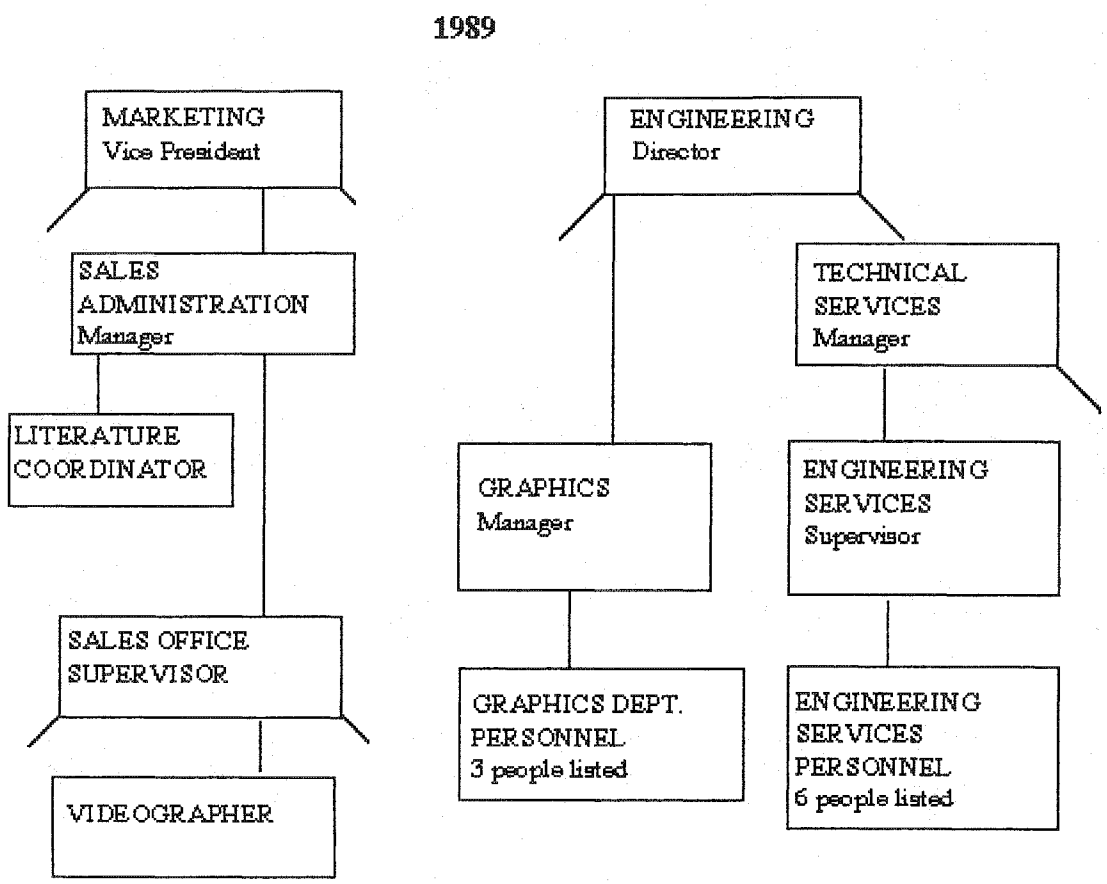

Figure 3.7 Document production 1989

By June 1990, the Graphics Manager retired, and the Foreman replaced him. A new printer person was hired, to accompany the previous positions of Print Shop Generalist, Typesetter and Photographer/Videographer. A technical writer was also listed that year.

Discussion

In this 20 year span, the nature of, and personnel in, document production and distribution changed dramatically. While the company had only a drafter and a printer in 1971, it later had over 15 people involved in the drafting, layout, printing and distributing process. In many areas, the document production/distribution staffing reached its peak in 1990. As will be shown in the next section, by the time the dissertation study started, that number had been whittled down drastically, as the Drafting department separated from Graphics, and the print shop personnel were cut, leaving the company only with consultants to assist marketing personnel and engineers with promotional and technical literature.

Table 3.1 Document production/distribution history

Document production/distribution history

	PEAK	CURRENT	FUTURE
Writing	Technical Writer Engineers Marketing	(Consultants) Engineers Marketing	(Consultants) Engineers Marketing
Layout/Visuals	Graphics Manager Photograher Videographer	(Consultants) (photography studios)	(Consultants) (photo studios)
Printing	Print Shop foreman 3 print shop personnel	(Local print shops)	
Distributing	Document Coordinator	Secretaries Engineers (people outside the co.)	WWW/Webmaster Consultants

Over the 20 years, one of the most stable job areas was in the print shop. The print shop positions remained largely the same from 1979-1991, with the number fluctuating between three and five people, which was influenced by turnover as well as layoffs. The technical writer position was also affected by turnover, transfer and termination, as it was a staffed position from 1973-1978 and again from 1989-1990. Likewise, the publications coordinator position was a formal position from 1973-1978 and then resurfaced in 1984,. As with the technical writing, the publications coordination tasks were still being performed in these off years, but it was not perceived by the company to be important enough for a full-time position, and was likely performed by various clerical staff.

The photographer/videographer position also underwent numerous transformations, as it began as a photographer slot in Engineering from 1979-1981, then became a Videographer position in the Marketing department in 1986, then became a Videographer/Photographer position in Engineering in 1990.

Clearly terminations played a key role in the composition of documents during this period. In the early 1980s, several key positions were cut which surely affected the

productivity of document production and distribution. However, the company still saw the need for these positions, as the technical writer, photographer and documents coordinator position were all brought back at different points in the 1980s. In addition, the cost of maintaining an in-house press, including the personnel, press equipment and space costs, was definitely not small. Part of the problem for cutting some of the positions could also have been the departure of people previously in those positions. Both the photographer and technical writer positions were vacated by people leaving the company or transferring, yet held unstaffed. This implies that the company might have kept these positions longer had the original personnel stayed in them.

Document Production and Distribution 1991-1996

Overview

In 1991, the company was at its peak of almost 1,000 workers, double the 1997 figure of 469 full-time employees (Lee, A11). From 1991 to 1995, organizational charts were not made and distributed (Fletcher, Miller). However, the history can be pieced together through employee recollections. According to several employees, the technical writer left his position at the end of 1990, shortly before the company was going to terminate that position (Miller, Martin) The videographer position was eliminated in the early 1990s, and all of the print shop personnel were terminated in January of 1994, leaving only the Graphics Manager. In a 1994 marketing department organizational chart, the position is listed as being under the Marketing Department. In February 1995, the Communications Coordinator (changed title) position was terminated. as was the Graphics Manager (Miller, Martin, Phone directory). The computer hardware and software he was using for publication design was sold to him in March of that year, and the printing press and other printing equipment was sold by August (Miller). Cutbacks in Feb. 1996 further reduced the document distribution staff, as the number of secretarial/clerical workers was reduced from five positions two 1.5 positions from 1994-1996.

In the summer of 1994, this researcher was hired as the first technical writing consultant. His tasks were to help redesign the catalog and produce manuals. He continued in the position during the summer of 1995, when another Purdue technical writer teacher was hired on a consultant basis. Since that time the marketing department has also hired two consultants to design marketing/promotional documents, and enlisted the aid of the Chicago-based branch of the international firm. Outside printers, including the company co-owned by the former Graphics Manager, have been used to print the manuals. Document distribution of annual reports, brochures, the catalog and instructional manuals is handled through the administrative assistant, who receives 50-100 document requests per week (Heath). Software personnel distribute their own documentation.

Discussion

This time period, especially the last two years, reflects the company's move to outsourcing. After consecutive losing quarters beginning in 1993, when its market share and profit margins were dropping, the company felt it necessary to downsize in order to minimize its losses. The print shop seemed a logical choice in January 1994, since it performed a function which could be duplicated (no pun intended) outside of the company, possibly without sacrificing quality and customer service. The further cuts in early 1995 show a more drastic move, however. For one, the move to outsourcing all of the graphics work and the move for all product schedules and documentation to be produced in Word 6.0 has reduced the visual quality of many of the documents (Martin). This can be clearly seen in the layout and the printing quality of current product schedules (see appendix). Because the Graphics Manager's computer, scanner, hard disks, 1200 dpi printer and Pagemaker and Quark software were sold back to him, no one at the company is now able to use complex graphics layout, even if they had the knowledge, inclination and experience.

Probably the most important loss was the technical writing position. While the number of products has grown, the number of people available to write and produce the documentation for these products has not. One problem which has occurred repeatedly is

having document distribution dates follow the product distribution dates. Engineering, sales and marketing personnel have all commented that not having documentation to ship with the products until months later has caused problems for both the customer and the factory personnel who must spend hours on the phone handling customer support calls (Martin, Gibbs, Bush, Miller, Bass). He left the company after less than two years, however, quitting two weeks before his position was to be terminated (Martin).

The problem of not having a full-time technical writer is intensified because of the complex nature of the company's products; a clear understanding of the products is important for brochure/promotional writers and absolutely essential for technical documentation writers, which makes outsourcing to consultants a time-consuming task for both the consultants and the marketing and engineering personnel. And, as one engineer pointed out, the communication process is broken down in both the writing and the printing process when these documents are outsourced (Miller).

These decisions about downsizing and technology tie in well with Feenberg's distinctions about the different views of technology. In the early stages of the move to electronic publishing, the technological decisions were largely been made using an instrumental theory framework, which has resulted in some questionable decisions. The choice to not only lay off the graphics manager but to sell his computer, scanner and page layout software was a decision to reverse the path technology was taking--implying that technology is a tool which can be taken away and not an irreversible cultural force--and led to a decision to repurchase that same software (an updated version of PageMaker) two years later. Similarly, the decision to place documents on-line in 1995 neglected to take into consideration the experience and culture of both the company and especially the customers, who operate largely in a print-based environment. This decision also seems to also take a substantive theory bent; the desire to use the World Wide Web (to be discussed in the next chapter) as a panacea to the financial problems of document distribution ascribes "quasi-magical powers" to the technology, Feenberg would argue (p. 5). At no point did those in charge allow for the democratizing potential of the technology; in fact, it ended up being a tool to but further their power and to lower costs.

Document Production and Distribution, 1997

In January of 1997, another reorganization took place. This time, the entire approach to the organization and product marketing was taken. A three-tiered system was implemented, with Level One being product development and manufacturing. Documents produced at this level include diagrams, product proposals, specifications and testing documents. Level Two concentrates on product support. As such, personnel in this department field phone and email queries from customers about troubleshooting difficulties and questions about the product. Documents are especially important at this level, and include technical manuals and product schedules, along with product bulletin updates for users. Level Three is Regional Marketing, and involves brochures, flyers and other promotional material. Under this schema, the marketing director is now in charge of North American marketing for metering products. Previously, he only worked on marketing meters produced in the factory; with the change, his responsibilities are more tied to products and not the location where the products are made. There were two reasons for this reorganization. For one, it is the organizational structure used by the parent company in Europe and allows the marketing director to work across national boundaries. The second reason for this different approach is because as mentioned before, the residential meter line, once produced in the factory, was moved to Mexico in order to be able to produce those meters with cheaper labor costs and thus higher profit margins. So, the marketing director simply is responsible for marketing products in the North American region; the products he promotes may be made anywhere, including overseas. Marketing personnel are currently mixed about the likelihood of success for this new organizational plan (Martin, 1997, Stetler, 1997).

Document production has also been altered since the beginning of that year. Previously, a Purdue student had been producing the documentation, but she stopped working in order to concentrate on her dissertation. Since then, the company has enlisted the aid of yet another freelance/consultant, a employee of another branch of the company who was a technical communications specialist until she stopped working for the company in 1995.

In late 1995 and early 1996, the company took the first steps toward establishing a web presence. They began negotiations with a local web company to begin designing and hosting a web site for the plant (not the entire company). Those plans were dropped when the company was bought out in the first quarter of 1996. Also in early 1996, a global organizational website is started, although it basically contains only a couple pages and a picture of the global headquarters and some brief text history. In April of 1996, the Building Controls division in Illinois starts creating their webpage, but it contains no information about metering, only a dead link. In the spring of 1997 that initial page is redesigned and then contains active links to metering with some product information and overviews. No documentation is included on this site, only some reorganized material from a product brochure.

1990	1992	1993	1994	1995	1996
Technical Writer leaves. Engineers, software programmers write manuals as needed (usually after the product is released)	Three printing press operators laid off. Press no longer operated Printing jobs outsourced to local print shops.	Market begins dropping Company begins string of losing quarters. Layoffs begin for production line workers.	Company hires technical writing consultant for catalog, manual.	Feb.--1/3of company laid off, including graphics designer and document coordinator March--Plan to move to electronic publishing announced May--Other consultants hired Aug.--Prototype email/ bulletin board distribution system	Feb--Global WWW page introduced March--Company officially bought. Shakeup in Mrkting dept. April--Building Controls (Illinois) Disvision WWW established--Plans made to attach to that page

Figure 3.8 Historical Events in document production 1990-1996

Another change is that Pagemaker began being used by the mounting devices unit of the company. While the software group is using Microsoft Word to lay out product schedules and other documents, the other department is creating similar documents in Pagemaker 6.0. What has happened, in Zuboff's terms, is a deskilling of the writing/graphic design work.. With the advances in printing and in graphical layout programs like PageMaker and the increased graphical capabilities of Word, even a novice user can easily and quickly create graphical layouts which design experts only a decade ago would have struggled with. These capabilities made it possible for the company to lay off its graphical designer. Product schedules which were originally done by the graphic designer were now being done by engineers or product managers in Word. The secretary was also doing some Pagemaker work with these documents, and I was solicited to give her a crash course in the program (2 hours). The same approach was taken at various times in the company with writing. Of course, this approach taken by the company ignores the fact that this deskilling cannot replace the action-oriented skills described by Niesser and Zuboff in In the Age of the Smart Machine (p. 186-88). The knowledge and experience in design possessed by the graphics manager and a technical writer cannot be replaced by technology or mere step-by-step instructions. And, the various skills involved in desktop publishing require extensive training (Sullivan, 1988), training that the company has yet to provide. In short, the company tried to deskill a task that requires great skill and knowledge.

OVERALL ANALYSIS OF ORGANIZATIONAL CHARTS

The organizational charts reveal the status of technical support documents at the company: when the company faces tough financial times, the people producing these documents are among the first to be laid off. This indicates a view that documentation is more of a luxury item that can be done without. In the times that it becomes clear documentation is needed, it is still not important enough to warrant having a full-time employee or a person with extensive background in the intricacies of the product.

The personnel and technological changes over the last five years have set the stage for the move to electronic publishing. With a drastically reduced writing, designing and

distributing workforce, electronic publishing--and web. publishing in particular--provides a means of producing and distributing documents at lower costs. This progression is most easily seen when comparing the document production and distribution paths between 1990 and 1997. In showing this progression I employ the methodology of mapping, as espoused by Sullivan and Porter. These maps help illustrate the document production and distribution pathways and show the influence of technology, not to mention the outsourcing which is becoming more common today in many companies. The first diagram characterizes the completely in-house writing/production system used in 1990 and the distribution of labor during that time.

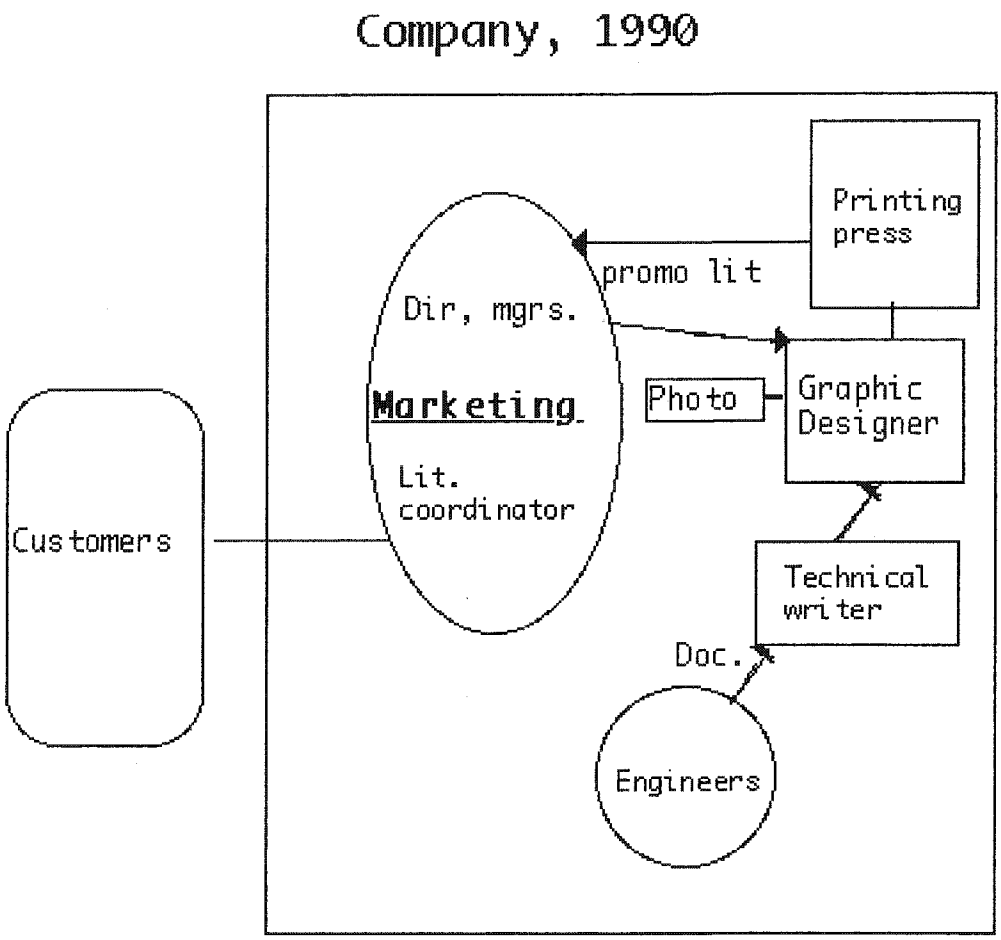

Figure 3.9 Document production 1990

Engineers and marketing personnel interacted with a technical writer, who wrote the manuals and other documents. Some of these documents went through the graphic designer, who laid out the text via paste-up (and later, computer) methods. The print shop personnel then reproduced the documents and sent them to the literature coordinator, who made sure the documents reached the customers. While marketing and engineering personnel no doubt did some of the writing, there was a clear and definite breakdown of tasks and responsibilities. In addition, all of this work was done in-house.

Mapping the scene in 1993 clarifies the changes going on. The layoffs of the print shop personnel and technical writer left the company with little choice other than outsourcing.

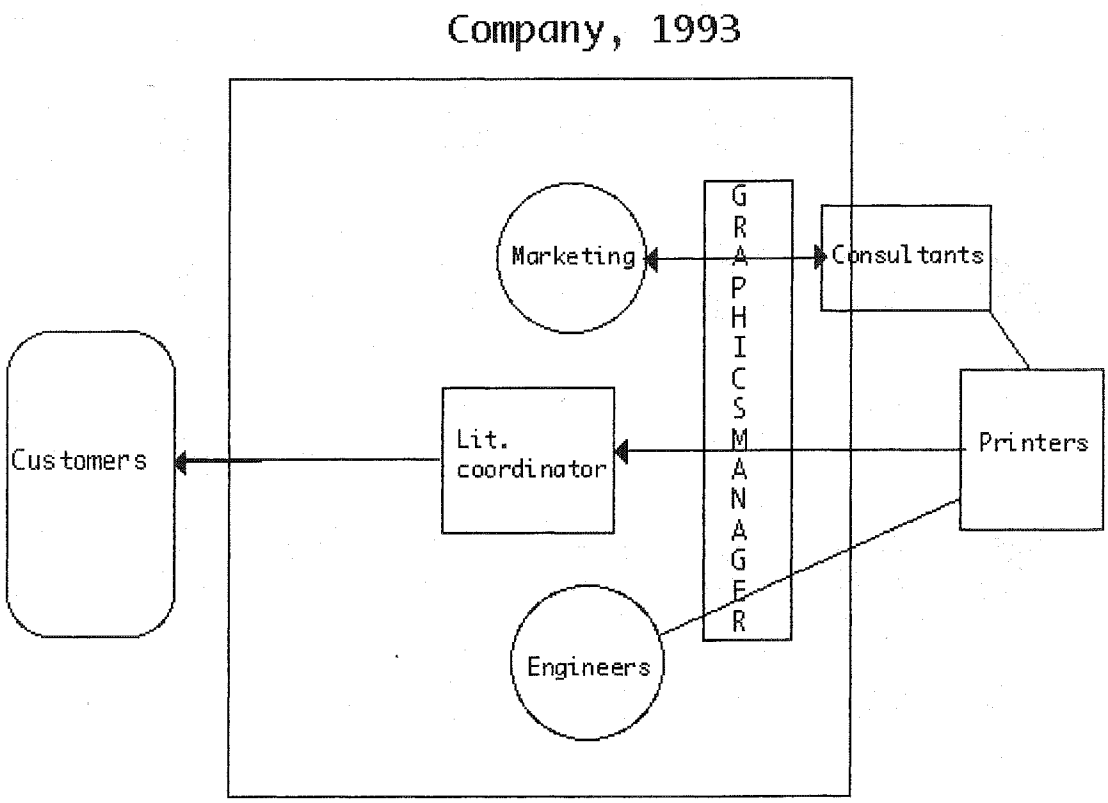

Figure 3.10 Document Production 1993

Any photographs were taken/processed at local photography studios. Marketing personnel began to rely on consultants to write and design some of the promotional literature, while the engineers were forced to write more of the manuals. These documents almost always went through the graphics manager for either major redesign or tweaking to make them camera-ready. The graphics manager occasionally ran the printing press for some color work, but for the most part, documents were either photocopied in-house or, more frequently, reproduced at local printing establishments. These documents were then sent to the literature coordinator, who distributed them to the customers.

The layoffs in 1995, especially of the graphics manager, contributed to even more outsourcing, as shown by the following diagram.

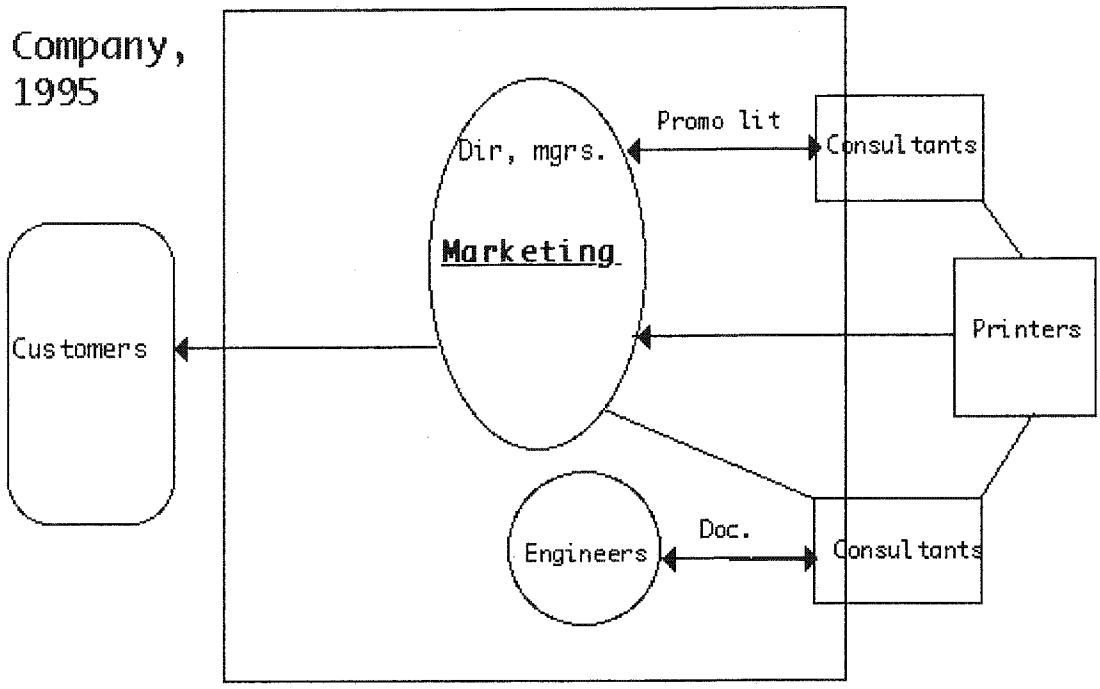

Figure 3.11 Document Production 1995

A marketing consultant handled promotional literature, and a technical writing consultant was writing and designing technical manuals. The sale of the graphic designer's computer, scanner, and page layout software necessitated any PageMaker work be done off-site, and Word 6.0 became the standard for document writing done in-house. Again, the documents were reproduced at local print shops, and the elimination of the literature coordinator position meant that various secretaries, engineers, programmers and marketing personnel were responsible for answering requests for documents.

A comparison between the 1980's graphic and the 1995 map clearly demonstrates the progressive move toward outsourcing and the erosion of the distribution of labor. While a document in 1990 might have been written, designed and reproduced within the plant, all three of those activities in 1995 might have taken place outside the plant. Those

documents produced in-house help illustrate how the barriers between job duties/positions have broken down. An engineer, for example, might be responsible for not only product development, but also writing a document, designing it in Word, coordinating printing runs, and sending the documents out to customers.

So what does the future hold? Quite likely it will at some point finally involve the web. Why? For one, the company is now owned by a large conglomerate that has dedicated web personnel. No longer is it a matter of having limited resources within the plant. In addition, the move to the web is more likely because of the increased ease of placing documents on the web. With a program such as Adobe Acrobat, a Pagemaker product schedule or piece of documentation can be turned into a pdf file and placed on the web within minutes. Increased web access of the utility companies will also contribute to a move to the web--the more companies that are online, the more it makes sense to move to the web. Finally, the increased web access will translate into greater desire and expectation to be able to access the documentation on the web. The company will need to have a greater web presence or risk losing their customers. The move to the web and changes in personnel will likely create a scenario similar to that illustrated in the following map:

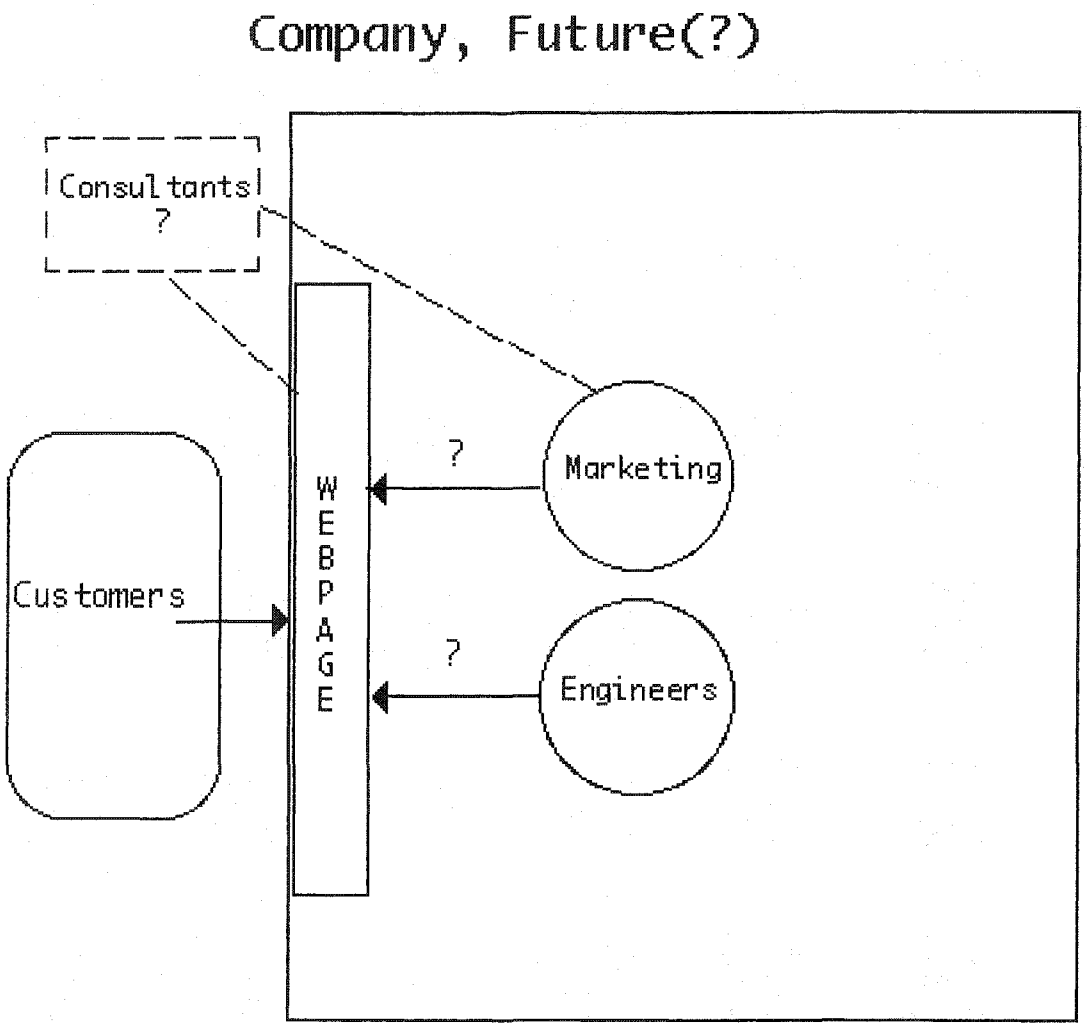

Figure 3.12 Document Production Future

The future changes in technology and economic conditions at the company will further alter the job duties of the employees and the production and distribution of documents. Depending on the literacy of the marketing department and engineers, these people may end up writing, designing and placing the finished documents on the webpage themselves. But, if the trend of outsourcing continues, then more and more documents will be produced by consultants, who in turn may not only write and design documents, but also

prepare these documents for placement on the World Wide Web. On the other hand, the reduction in printing costs may allow the marketing department to hire a full-time writer/web designer who can produce the documents and put them on the company's web server. If this happens, the entire operation can be done in-house. Again, the changes in technology allow for a drastically different writing/production environment than existed only a decade earlier. Interestingly, the role of the customer is also changed in this environment. Earlier, the company sent documents out upon request or when a new product was issued. In the near future, the customer will have a more interactive role and be able to access desired documents themselves instantly (but may also bear the load of printing out hard copies of the documents).

Turnover/lost sources

One other limitation was the fact that I was not able to contact some of the employees who left. Some of the employees who were laid off or who took jobs elsewhere out of fear of being laid off were no longer available to be interviewed. Some of these employees, including one in marketing, would have likely been responsible for creating some key documents and would have been very useful to the study. In addition, another key person who left the company was going to be responsible for tracking requests for documentation, to see how many documents were requested each week/month and what type of customers were making the most requests. I had planned to use that data to better judge the costs involved in documentation support and possible cost savings by implementing an electronic publishing system.

CHAPTER 4: CULTURE AND THE ROLE OF POWER, LITERACY/TECHNOLOGY, AND DESKILLING AND DOWNSIZING

INTRODUCTION

As evidenced in Chapter 3, the culture being studied has a complex history, a complex set of relationships and a complex writing and technological background. The purpose of this chapter is to expound upon those areas as they relate to four of Feenberg's categories involved in the democratization of the workplace which were discussed in Chapter One: culture, power, literacy, and deskilling. While I will try to keep these categories distinct from one another for the sake of organizing the chapter, there is naturally much overlap between them. Literacy has a huge impact on power, working off the old maxim that knowledge is power. The more literacy that customers, technical elite or ownership management had, the greater their likelihood to exert influence over decisions and to change the course of the technology being used. Likewise, power plays a big role in deskilling; those workers with the least amount of power are the ones who quite often have their positions deskilled. And culture, of course, runs through all facets of the relationships and decisions made. All four categories overlap in regards to what happened at the company—the people with the greatest skills/technological literacy and who potentially had the greatest opportunity to exercise power in increasing the amount of worker and customer control were the ones who had their jobs eliminated or deskilled and who ended up losing all power by losing their jobs.

So, while I will separate the four categories in my discussion below, I will also examine the important intersections between them—how literacy affects power and vice versa, how literacy was affected by downsizing and vice versa,
how power and downsizing/deskilling were interrelated, and how culture, through the main lenses of image, cost, speed and convenience affected power, literacy and downsizing, Other culture related aspects will be discussed with the power and literacy sections.

DOWNSIZING/DESKILLING

The previous chapter focused on the history of document production and distribution at the company, which in many ways is a history of a build-up of personnel and skills—peaking with the employment of a technical writer, videographer, photographer, graphic artist, document coordinator and pressmen—and the subsequent downsizing in the mid-1990s, when all of these positions were eliminated. To avoid redundancy, this chapter will not cover downsizing/deskilling in great depth in a separate section within this chapter. Rather, each one of the other separate sections will contain a discussion of downsizing/deskilling issues, as they relate to the issues of power, literacy and culture. In addition, the final conclusion will tie in downsizing and deskilling to how and why the main document-related decisions were made, the implementation (or lack of implementation) of those decisions and the success of those decisions.

LITERACY

In my opinion, in many ways, technical literacy is similar to traditional literacy, in that there appear to be three main obstacles/components/stages. For traditional literacy, these elements are access to reading materials, the ability to read, and the ability to write (these latter two categories are naturally subdivided into many more levels, usually based upon reading/writing ability at x grade levels.) Once a person gains access to reading materials—a key obstacle in many places and time periods—he or she can, most often with help, begin to learn how to read and then later learn how to write. The technical

literacy stages correspond closely to those of traditional literacy. The first stage, of course, is access to the technology, which Selfe (1999) and LeBlanc (1994) point out is a key issue in education, especially in poor and minority schools, homes and communities. The second stage of computer literacy, similar to the ability to read, is "reading" the computer or other technology--achieving familiarity, confidence and competence with the operating system and necessary programs. Like writing, the third stage involves using the technology to create something. And, as with writing, it takes more time and training and skill, and like writing, enables the person to effect greater change within and outside of the computer environment.

Let me take a minute to explain these three stages in terms of a programmer, a writing teacher in a computer classroom, a person designing documentation and a person using web technologies. For the programmer, the comparison with traditional literacy is easy: the programmer gains access to sufficient hardware and software, learns how to use or "read" the operating system and languages, and then learns how to write programs (here, and with other traditional and technological literacy skills, the learning of "reading" and "writing" often overlap).

Computer literacy for the CAI writing teacher involves access (for both her and her students, in the classroom and office or home), becoming familiar with the programs, and then progressing to an advanced level—through experience, training and trail and error—to be able to create and tweak systems and troubleshoot problems that crop up when teaching in a computer classroom. As a personal example, I began my teaching career not having a computer classroom. Two years later I gained access to a computer lab/classroom. It took at least a semester or two to move to the second stage, being able to know the programs and use the technology to teach in this environment. I have since progressed to the third stage, the "writing" stage. At my current institution I have set up the Appleshare file system for my classes, creating student folders and security systems, and I troubleshoot problems with printing, frozen computers and memory allocations in order to help my classes run more smoothly.

For the document creator, the first stage is access to not only a computer and a page design program, but also access to key peripherals such as a scanner, digital camera,

Zip or Jaz drive, photo-manipulation software and a printer which produces camera-ready copy. The second level, of course, involves becoming proficient with this hardware and software. But, as the field has seen from many bad examples of desktop publishing, this second stage of literacy is not sufficient for producing professional-quality work. To reach the third, "writing" stage, the document creator must also have an understanding of rhetorical and design principles, knowledge of shortcuts and advanced features and a grasp of the intricacies of printing, such as how a hunter green color on a Samsung 17 inch monitor will actually appear on an 80 lb vellum finish Imperial Ivory Hammermill paper stock—and how to recalibrate the monitor to match those colors.

For the person using web technologies, access likewise entails more than just a computer and a program, such as a browser. While a person with a 14.4 modem and a 486 computer and Netscape 2.1 may technically have access to the web, they are very limited in their accessibility to many sites with large graphics, frames, Flash and java applets. If the person has sufficient access, he or she is then able to progress to the second stage, to learn how to use the browser and plug-ins to find sites and information. An advanced second-stage web user will learn boolean search strategies, understand the strengths of various search engines and adjust or truncate the address of a current site being visited to find information more quickly. The third stage of web literacy, again similar to traditional literacy, involves the "writing" of web pages, the creating of html/perl/java scripts and web pages and knowing how to post that site or page to be accessible on the Internet. (One could easily argue that the proliferation of easy-to-learn WYSIWIG html editors and html page creators within word processing programs has relegated page creation to second-stage literacy status, like with DTP). Third-stage literacy might involve the use of more advanced programs and programming languages, or, similar to the page creator scenario above, the ability to employ a greater degree of experience, skill, education/training and design principles in creating professional-quality web sites. (Within all of these examples are gradations, of course. In the traditional literacy mode, for example, someone who can read a Dick and Jane book may not be able to begin to decipher writings of Susan Sontag or Walter Ong. A person may be able to fill out a job application, but may not be ready to write a letter, a persuasive essay or a dissertation.

Similarly, someone may have varying degrees of competency within the technological literacy categories.)

These latter two examples of computer literacy (DTP and Web authoring) fit in well with the culture being examined in this study. For the company, computer literacy of the engineering and marketing personnel was critical in a time of downsizing, when those with the DTP/web literacy were laid off. For the customers, the ability/access to get online and to know how to use the technology to access documents from the company via email or the web was going to be essential if the company's plan to move to electronic publishing was to succeed. These examples also parallel Feenberg's discussion of the French Minotel in *Alternative Modernity*, as he focused on the issues of citizens having access, citizens learning and using the technology, and "hackers," the users at the level of writing/creating with the technology which paved the way for alternative uses for the technology.

Access/Literacy of Customers

Because the customer literacy was so essential, I chose to undertake a survey of customers, which is described in detail in Chapter Two. The survey was given to gauge the access level, computer/web literacy and preferences of the customers. The main questions centered around the methods of document distribution which had been used or were being considered by the company: paper, fax-back, disk, CD-ROM, email and World Wide Web. The following section details customer access/literacy levels with these various technologies, provides a graph of the survey data, and analyzes the results of each response in light of the company's plans to implement an electronic publishing system. Before that survey, however, is a section devoted to the marketing department's expectations of customer access/literacy levels. After the survey is section which delves into the literacy levels of the various company branches and employees and how that literacy impacted the decisions and actions of the company.

Director of Marketing's Expected Results

The marketing director was interviewed in May, 1996, about his expectations for customer responses to the survey. He went through each question and gave his estimations for how the average customer would respond.

The director of marketing predicted that the average customer would have a 386 or 486 IBM-compatible machine running Windows 3.1 Approximately 50 percent would have a modem (with an average speed of 9600bps), he guessed, while 20-25 percent would have email accounts and 5 percent would be connected to the World Wide Web. Ten percent would have CD-ROMs and 95 percent would have faxes. He added that the number of CD-ROM owners would likely jump to 25 percent in 1997, while the percentage of customers on email would rise to 30-35 percent and those connected to the WWW would rise to 10 to 15 percent. He said that the average customer requests documents one to two times per year, and that their preferred document medium would be paper. As far as electronic choices, he predicted computer disk would be first, followed by electronic mail, fax back servers, CD-ROM, and the World Wide Web. The director noted that the customers would choose disk first because of their familiarity with that media and because they would all be able to use a disk. He predicted email would be ranked ahead of fax-back as an option--in spite of fewer customers having access to it--because of the transmission costs and poor resolution of printed out material. He commented that CD-ROMs have been tried by companies in the industry before with limited success, and that is why it would rank only above WWW, which would be at the bottom because of lack of access to the Web.

Customer Survey results

Fax

Every single person responding to the survey indicated that they had a fax machine. Of those noting how long they had this technology, the average time of initial fax purchase was 1991, five years prior to the survey. Clearly, this widespread use of the fax

machine fax-back servers means that this is one viable means of electronic document distribution. As will be discussed later, this capability does not necessarily mean that customers would like to receive their catalogs and documentation via the fax, however.

Some customers, though, had already used a fax-back server system. Although 38 percent responded that they had never used such a system and 17 percent didn't know, 20 percent said they use fax back servers a few times a year, 15 percent use them monthly, and another 10 percent use them on a daily or weekly basis. As these figures indicate, nearly half of those surveyed had used fax back systems before. Thirty-nine percent of those surveyed said they would either definitely or probably use a Company X fax-back system if one were put into place, while 31 percent answered "possibly" and the remaining 30 percent indicated "not likely" or "don't know."

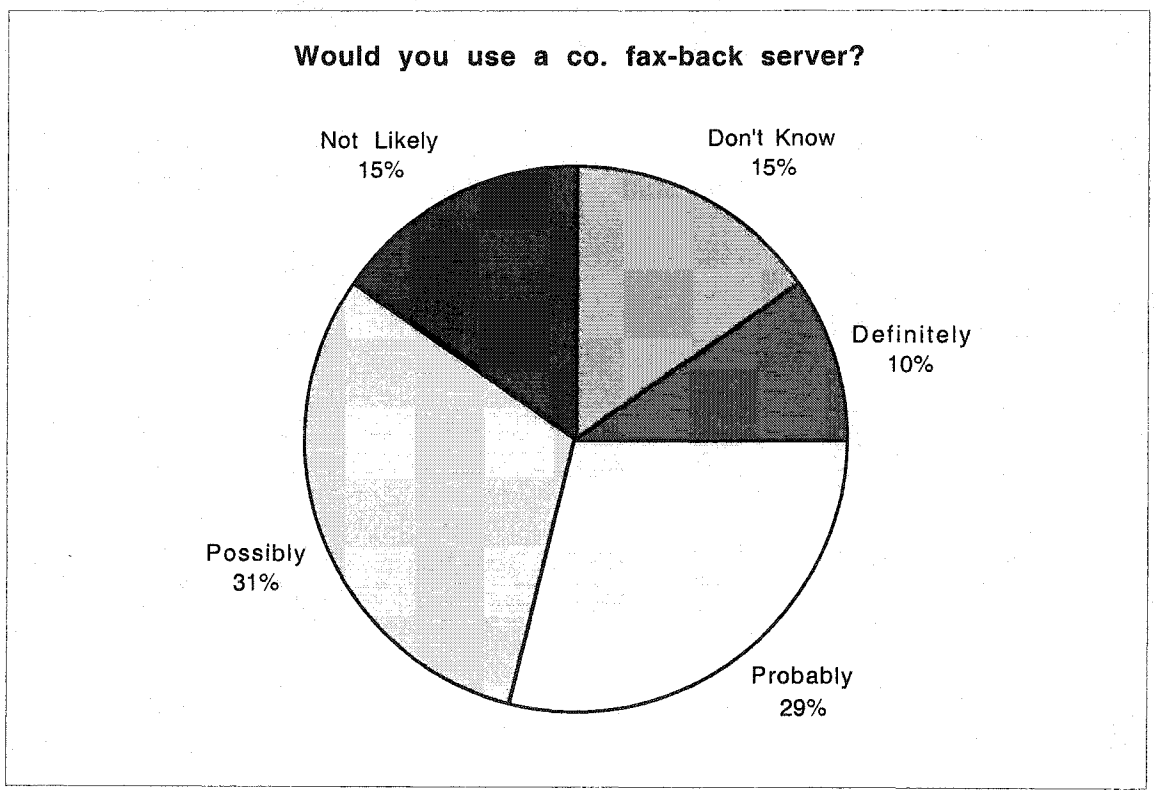

Figure 4.1 Fax survey results

Computer Hardware/Operating System

One of the first questions on the survey asked about the hardware they worked with at their desks. 53 of the 87 respondents (62 percent), had Pentiums as their top machine, while 32 percent listed 486s, two percent listed 386s, 1 percent had 286s, 1 percent did not know 2 percent noted that they did not have a computer.

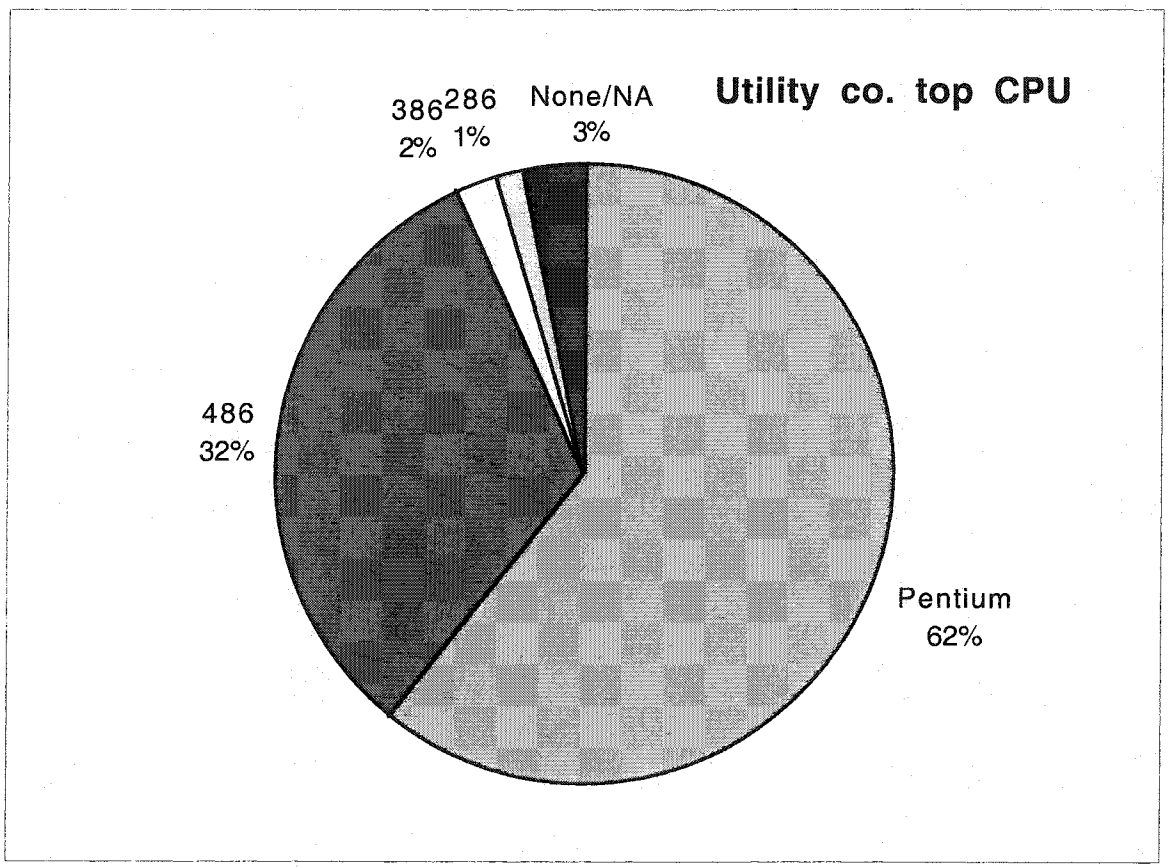

Figure 4.2 CPU survey results

Five persons surveyed--6 percent--also circled Macintosh as one of their computers/operating systems. However, every respondent who had a Macintosh also had a PC. So, while a few companies had Macs, 100 percent of the participants listing a machine had IBM-compatible computers. While the utility industry may not be reflective of all industries, it is clear that anyone entering this field will need to be familiar with PCs. By the same token, any computer distribution method selected by the company, and especially disk or CD-ROM versions, should be Windows/DOS based. This 100 percent

figure allows for single-platform electronic documents, which is much cheaper and less confusing than creating and distributing multi-platform documents, especially for computer disk distribution.

The survey also revealed that the size of the computer disk would also not be a problem. 100 percent of the companies having a computer noted that they have 3.5 inch disk drives. 21 of the companies circled that they also had 5.25 inch disk drives as well.

The operating systems used were less homogenous. 32 percent listed Windows 95 as their top operating system, with 51 percent having Windows 3.1, 7 percent running DOS and 5 percent running Windows NT, with "none," "Don't Know" and Unix making up the other 5 percent. Clearly, at the time of the survey, any electronic distribution method would have needed to accommodate Windows 3.1.

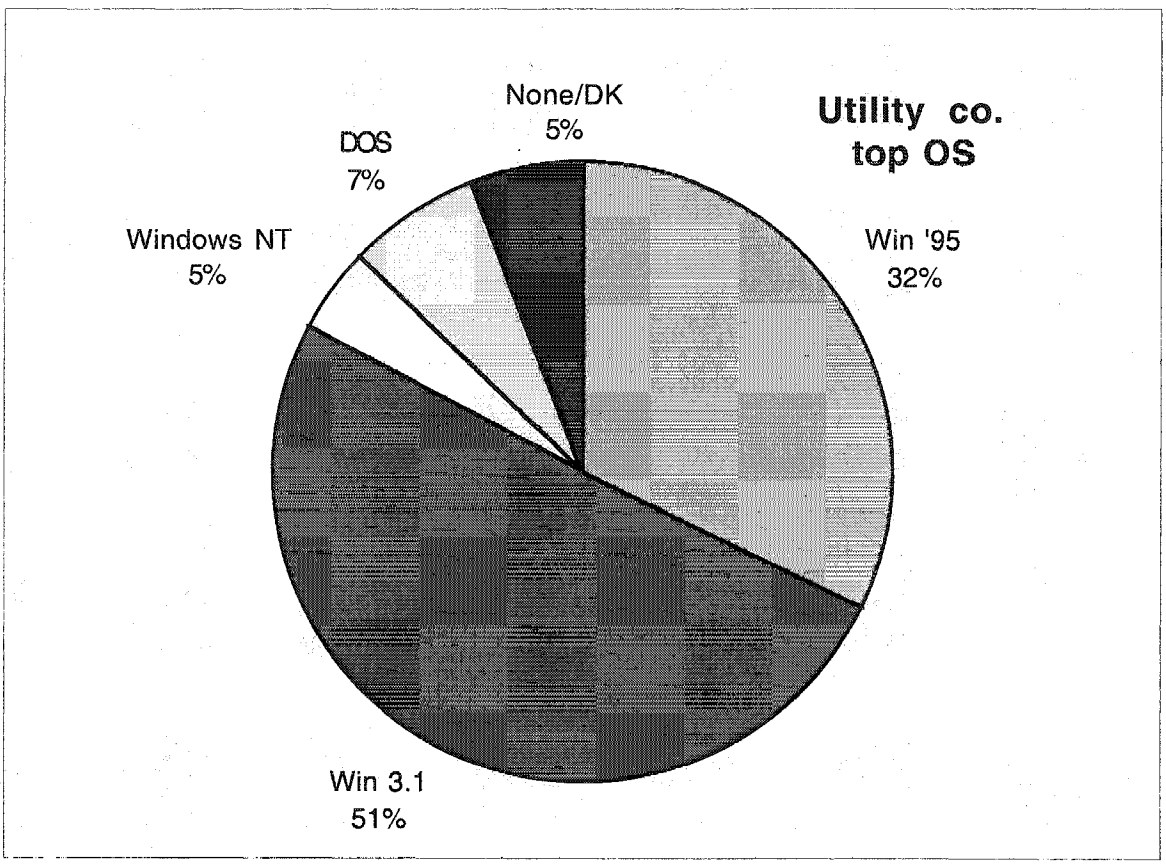

Figure 4.3 Operating system survey results

CD-ROM capabilities

In a meeting prior to the distribution of the survey, the marketing director predicted that approximately 10 percent of those being surveyed would respond that they had a CD-ROM currently and that as much as 25 percent would have the capability in 1997. The actual percentage currently, according to the survey, is 69 percent, more than two-thirds. In breaking down the results by the three types of utilities, it was found that 47 percent of the municipals had CD-ROM access, compared to 55 percent of the IOUs and a whopping 79 percent of the REAs. This finding was surprising to the marketing director, as well as this researcher. This is a huge discrepancy.

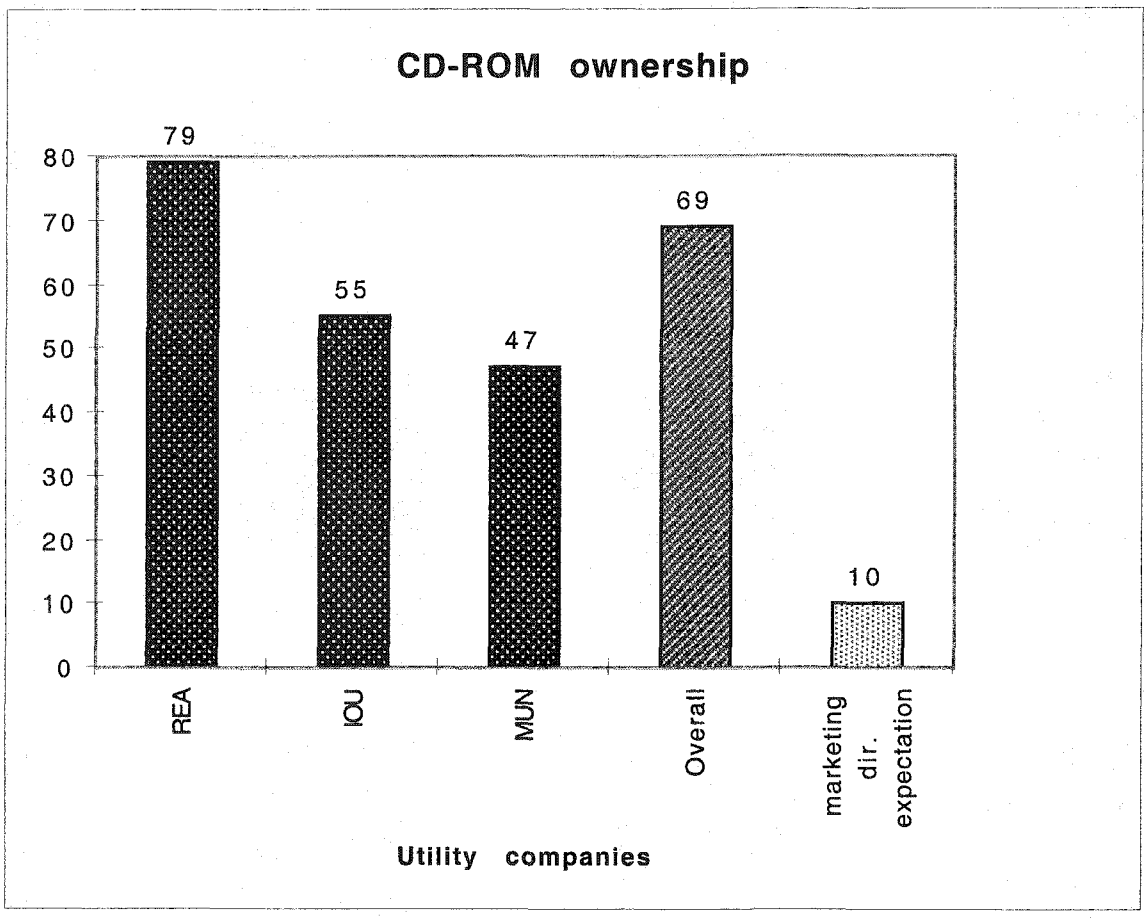

Figure 4.4 CD ROM ownership survey results

These percentages indicate that CD-ROM distribution does seem to be one viable option, at least much more so than was originally thought. However, those without drives currently did not anticipate buying one in the next year (only 8 percent said they definitely or probably would buy a drive) and only one respondent (4 percent) said they would buy drives if the company offered documentation and catalogs on CD-ROM.

As far as speed, of those that had CD-ROM drives, 5 percent had 8X drives, 20 percent had 6X, 30 percent had 4X, 15 percent had 2X, and 30 percent did not know what speed their CD-ROM drive was. Because over 50 percent had 4X drives or faster, drives which would be able to play movies (although small and occasionally choppy), multimedia is a possibility to include with text documentation.

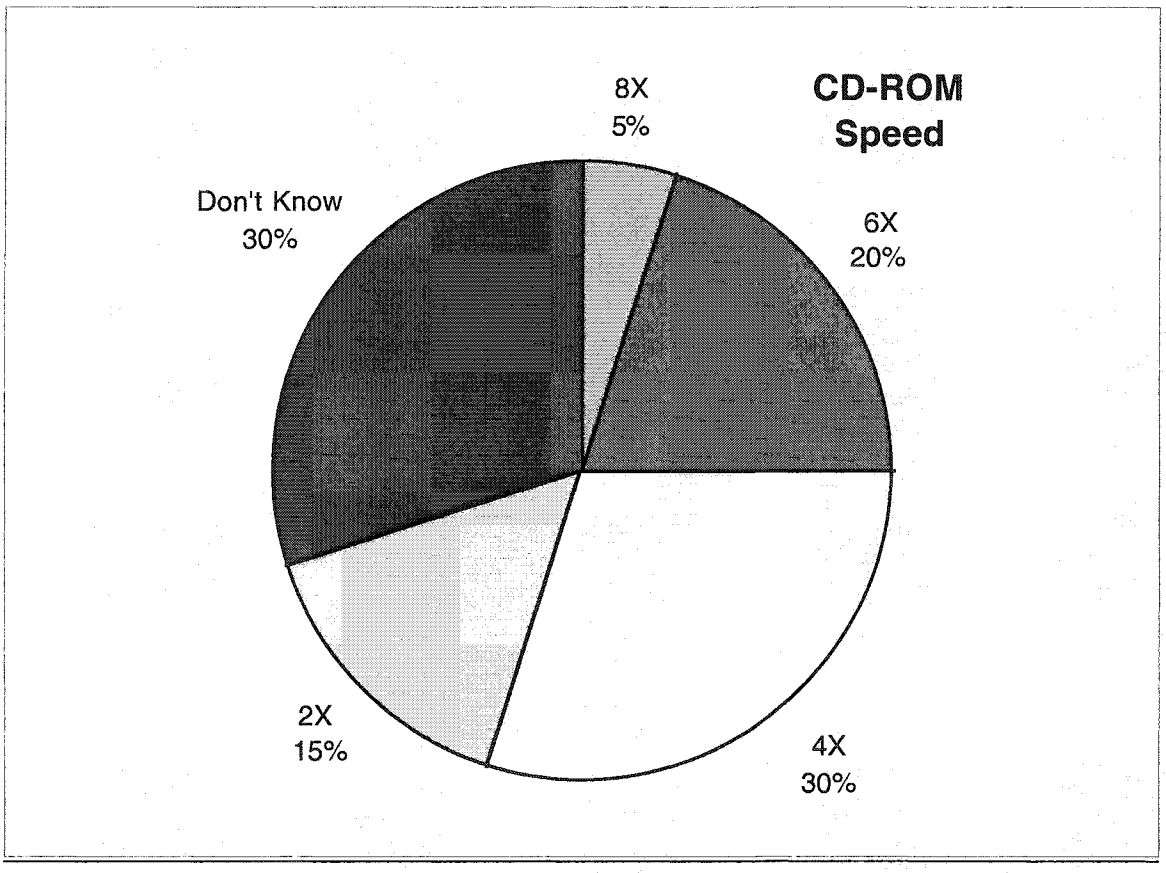

Figure 4.5 CD speed survey results

Modem capabilities

Modem access was another key question on the survey. 72 out of the 87 participants--83 percent--had modem capabilities. Broken down into categories, this is 91 percent of REAs, 82 percent of IOUs and 53 percent of Municipals. This figure was higher than the marketing director's initial prediction of 50 percent for the companies.

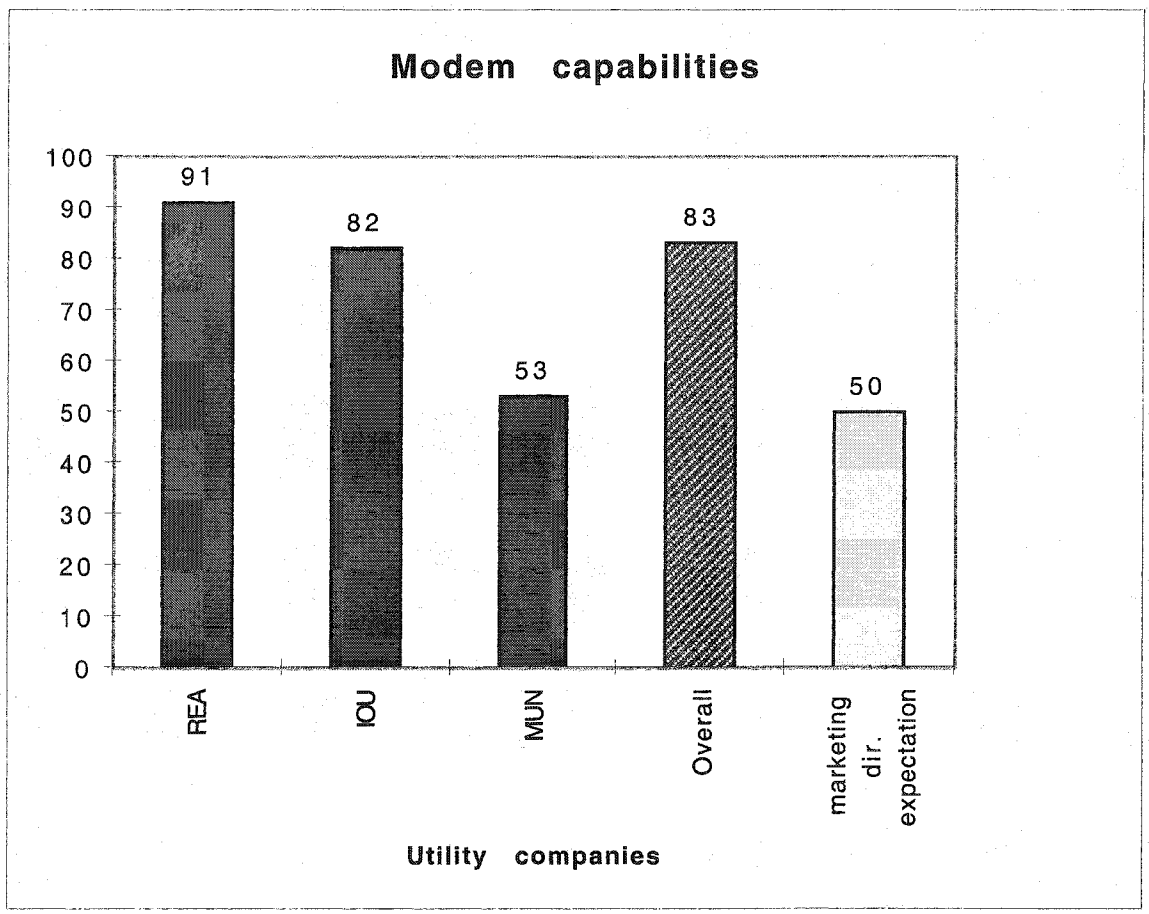

Figure 4.6 Modem survey results

This was an encouraging number for the company, since it signals potential email and WWW capabilities for communication and document distribution. At present, however, the number of people listing an email address was much lower. Twenty-eight percent of

those surveyed listed their email address, very close to the marketing director's prediction of 20-25 percent having access, which he thought would go up to 30-35 percent in 1997.

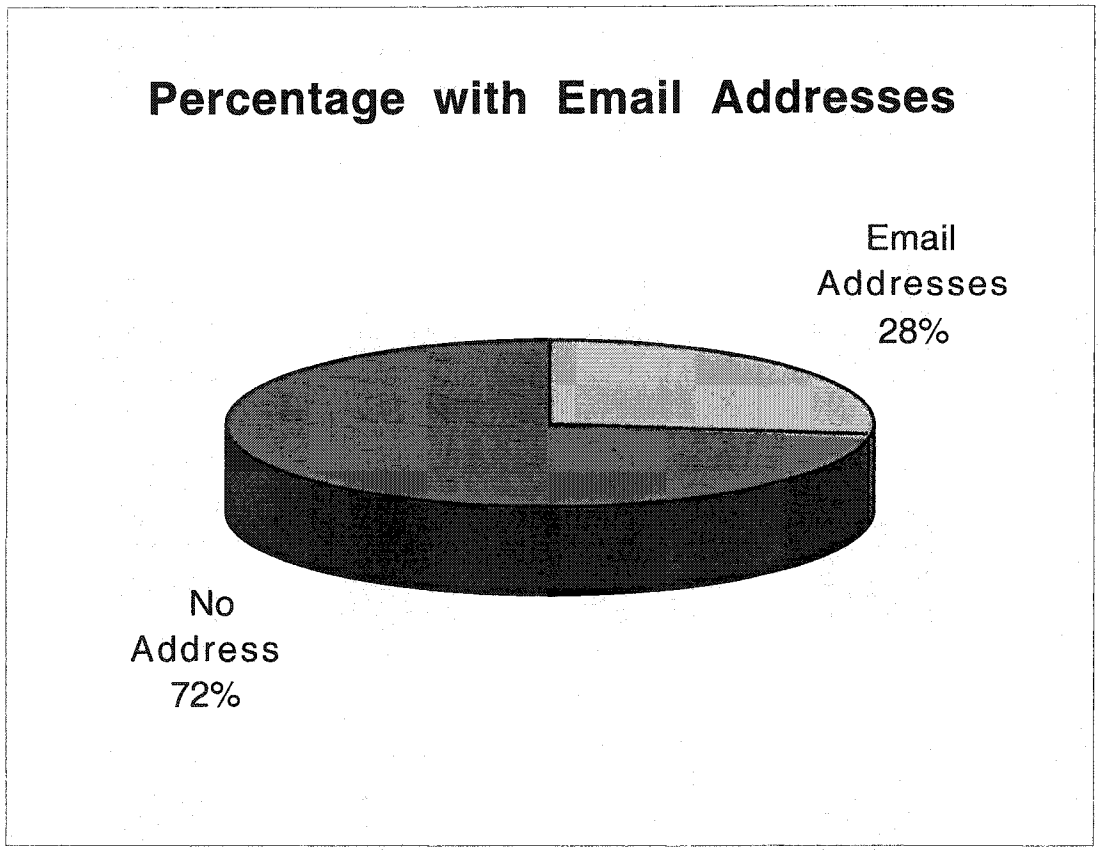

Figure 4.7 Email address results

Why the large discrepancy between the percent of modems and email addresses? Part of the reason, naturally, could be because the people did not want to give out an email address or had one company-wide email address or the person did not know the email address. Part of the reason also could be because they had WWW access, but didn't have their own personal email account. However, probably the biggest reason is the nature of the industry. Utility companies often can access their high-level meters via modem. With these modems they can get real-time billing information on their largest clients, without

having to send a meter reader to the site. So, in many cases their prime use of the modem may not be for communication with people, but with meters.

WWW access

A surprising 54 percent of the survey participants indicated that they had WWW capabilities. In breaking down this into the three utility company categories, 64 percent of the Investor Owned Utilities had access, 60 percent of the rural electrics, and 34 percent of the municipals.

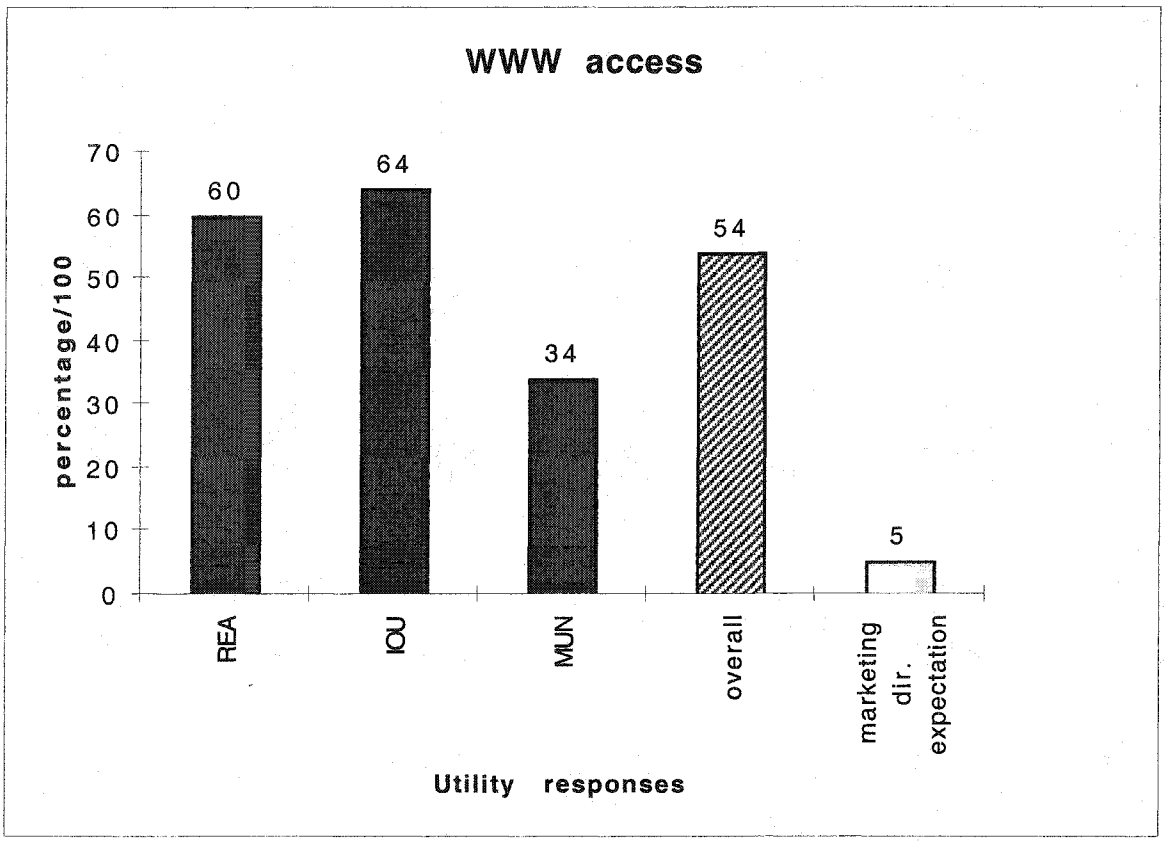

Figure 4.8 WWW access survey results

The surprising aspect of these figures is the comparison to the expectations of the marketing director of the meter company. He estimated that five percent of the companies surveyed would have WWW access, with that figure rising to 10-15 percent by mid-1997.

So, while distribution of documents via the Web was a questionable option when only 1 in 20 of the customers were predicted to have web access, when over half have these capabilities, the option becomes much more viable. For those that have connections, 51 percent said they downloaded documents or software on a daily or weekly basis, while another 34 percent downloaded documents less frequently, and 15 percent didn't know

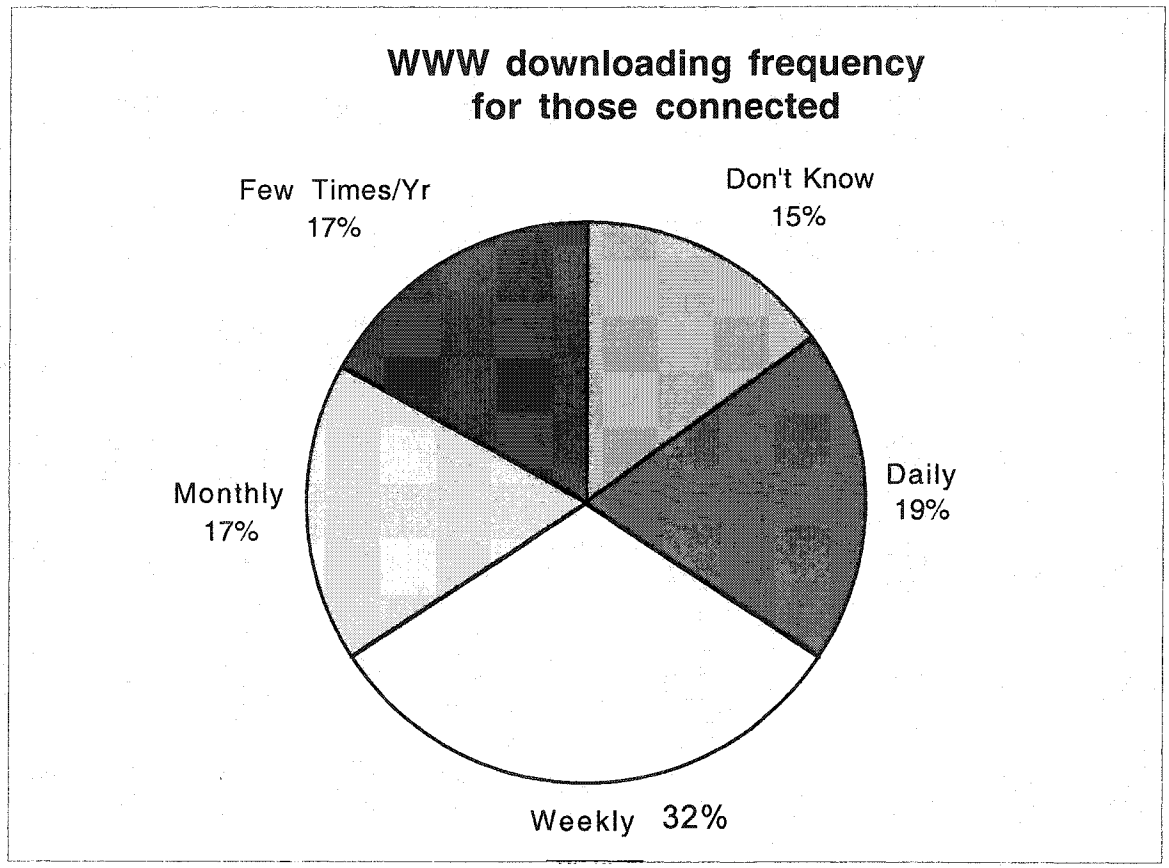

Figure 4.9 WWW downloading survey results

In addition, one third of the companies not only had web access, but also had their own homepages on the Web. 33 percent said their company had a page, 57 percent said their company didn't, and 10 percent did not know.

Of the 31 who were not connected to the Web, only 5 (17 percent) said they definitely or probably plan to add that capability in the next year. Only three responded

that they would gain access if the company chose to place documents for downloading on a Web site.

Distributor survey results

The distributors' responses were very close to those of the customers and higher than the expectations of the marketing director. Sixty-two percent of those surveyed had Pentium computers, while the other 38 percent had 486 machines, and none used Macintoshes or other hardware. Fifty-four percent were operating Windows 95, 31 percent were using Windows 3.1, while other operating systems comprised the remaining 15 percent. In terms of other hardware, 70 percent had CD-ROMs, with all but one of those with CD-ROMs having quadruple speed drives or faster. Only one of the 13 distributors did not have a modem used for data transfer, and 62 percent were connected to the World Wide Web. Four respondents, 31%, noted that their company has a World Wide Web page.

Discussion

What all of this data indicates is that electronic document distribution is feasible in the utility industry. Essentially, there are six main methods or medium for document distribution. The most common and obvious is paper. Of the electronic forms, there is faxing, which includes fax-back servers, which allow the user to select among a list of options in downloading the document desired. With 100 percent capabilities, this would seem to be one option that virtually all of the companies could use. 100 percent of companies also had 3.5" disk capabilities, which means this method of distributing documents would also work for everybody, although it has drawbacks which will be discussed later. Of the computer-related methods, email, is one of the least user-friendly (in 1996). People with email accounts could be sent files, although these files could eat up the user's allocation of storage space. Those with email accounts could also use ftp (file transfer protocol) to download documents from the company's server, although

many programs use a menu driven system in which the user can simply select from a list of options on the screen and the document will automatically be transferred into their account. With modem access at 83 percent, this too might be feasible, especially if the system were user friendly. That modem percentage, coupled with the World Wide Web percentage of 54 percent--a number likely to grow, and perhaps grow rapidly--could also lead to the Web as being a potential source for document distribution. Finally, CD-ROM capabilities--currently at 69 percent, according to the survey, also leaves this as a potential means for giving technical manuals and catalogs to clients. With most all new computers being shipped with CD-ROMs, this percentage will surely grow, eventually reaching near 100 percent, perhaps before the end of 2001.

Of course, computer usage and computer capabilities do not always go hand in hand. Two factors come into play: the benefits and drawbacks of the technology and user attitudes toward the technology. In terms of the benefits of technology, a CD-ROM catalog, for example, would be able to include much more detailed information, graphics, user guides, etc. and allow the user to automatically print out their personalized order form. Of course, the drawbacks of access time may discourage some people. As mentioned earlier, those intimidated the technology may not use the CD-ROM or other technology, and may prefer to only work with paper.

So, from a strictly first-order literacy (access) perspective, the customers were most able to deal with, in decending order, paper, fax, disk, CD-ROM, WWW and email. The second-level literacy level most likely paralleled this order, and in most cases, the customers most likely did have second level literacy, in part because the skills needed to access documents using these technologies was not complex or out of the realm of most of their traditional office/computer equipment experience. Paper/print literacy is a given, of course. Fax-back server technology is not complex (calling a number of indicating the number requested) and had already been used by nearly half of the survey participants. Accessing a file on a floppy disk had been standard computer literacy since the late 1980s. Accessing a file on a CD-ROM required the same basic skills as the floppy. Downloading files from the Web, the second to last item on the order of first-level literacy, could be a bit more complicated, although not terribly so, as validated by the

85% of connected customers who had downloaded a file in the past year. As was the case with first level literacy, email second-level literacy no doubt pulled up the rear, as the limited number of people with email addresses, not to mention the complexity of working with some file servers and sometimes with UNIX for downloading/ftping, made those with these skills in the minority.

In many respects, third level literacy for the customers was irrelevant, because the main concern for the company was accessing the documents, not creating the documents or distribution systems. But, it should be noted that at least one customer did have third-level literacy. This customer approached the part-time technical writer asking for electronic versions of the documentation: "He wanted disk copies of the manual. And he cut it up and put it into a hypertext version. And you could ask questions, and you get connected to this part or that part...He said they do that with all the documentation they use. They put it on CDs and then distribute them that way so it's all without paper" (Reilly 1997). What is significant about this anecdote is that it bears similarities to Feenberg's account of the French Teletel (email/messaging system), in which customers with advanced literacy alter the way a system was intended to operate. Had the customer mentioned above put these hypertext versions on the Web or circulated these CD-ROMs to other utilities and word got out that this option was possible, it could altered the power structure and forced the company to change its method of document distribution.

In conclusion, a few observations and comments: First of all, a reminder that the people responding to this survey might have better computer capabilities than their counterparts who didn't answer, which means that the percentages with CD-ROMs, WWW access, etc, may be higher than what really exists. Another point from the survey: at least in the utility industry, there seems to be a customer reliance on having permanent items in their possession. The most popular first choices for document distribution were paper, disk and CD-ROM, while these same items were the least mentioned last choices. So, in moving to electronic distribution of documents, a company needs to consider this customer need to feel something tangible in their hands. At the same time, it is clear that attitudes are changing, and this same survey distributed three years from now may reveal dramatically different results. Near 100 percent CD-ROM capability and WWW access--

not to mention a growing comfort with CD's and electronic documents from the WWW--may mean that these two mediums may soon rival or overtake paper as the document distribution method of choice.

LITERACY OF BRANCHES AND PERSONNEL

The following charts illustrate the level of literacy displayed by the various company branches and workers involved in the document production and distribution cycle. The levels indicated are estimates based upon several research methods. One of the most common research methods was observation, examining who had what programs on their computers and who used what programs to create documents. I also relied on an analysis of documents produced by the various individuals, gauging the level of experience based upon the quality and complexity and appropriateness of the tools used. Finally, I estimated the levels below based upon my formal interviews and informal conversations with the people listed below and the employees who worked with these people. The levels indicated in the charts follow the levels of literacy outlined earlier in the dissertation:

Guide to the charts below
NK=Not known
0=no access
A=Access, such as access to the technology (in print literacy terms, access to books, pen/paper)
B=Basic, the ability to understand and use technology at a basic level (in print literacy terms, the ability to read)
C=Complex, the ability to use the advanced capabilities of the technology, perhaps creating something new (in print literacy terms, the ability to write)
Levels within those categories of literacy
1=low level
2=medium level
3=advanced level

Examples of Levels

HTML

A-1 Level Access would indicate access to a basic word processing program, since HTML can be written in such a program. A-2 level access indicates a basic HTML editor, while A-3 is WYSIWIG editor.

B-level literacy is the ability to create non-professional web pages (basic personal pages), while C-level skills would indicate the ability to create a professional, commercial website (C-1 for a basic site, C-3 for a site with such features as java/perl, frames, database, e-commerce, etc.)

Word

B=ability to use the program to create a basic document (changing fonts/sizes, copy/paste, etc.)

C=ability to use more complex page formatting features

Pagemaker

B= ability to create non-professional quality brochures, pamphlets, etc.

C=camera-ready, professional quality with attention to details such as tracking/kerning/leading, trapping, color matching/color separations, etc. sense of design

Scanning/Photoshop

B=Able to scan and make basic photo improvements —brightness and contrast, sharpness

C=color correction, knockouts, text, layers, modified filters—essentially creating something new as opposed to just enhancing an original

Drawing

A-1—access to a basic drawing program, such as that found in Microsoft *Word*
A-3—Illustrator, Corel Draw, etc.
B—ability to create non-professional artistic work using the program
C—ability to create artistic work acceptable for company use

Table 4.1 Document production literacy

Position	Word	Pagemaker	Scanning/ PS	Drawing	HTML
Plant manager	NK	0	0	0	A-1
Marketing Head	B-2	0	0	0	A-1
Mkt Prod. Mang.	B-3	0	0	0	A-1
Software group	C-3	0	C-2	A-2	B-3
Engineering	C-1	0	0	0	A-1
Doc. Coor.	NK	0	0	0	A-1
Graphic Des.	C-3	C-3	C-3	C-3	C-1
PT Tech Writer	C-2	C-1	C-1	C-1	C-1
Consultant	NK	C-2	NK	C-2	NK

Table 4.2 Document Production Technology--1997

	Word	Pagemaker	Scanning/ PS	Drawing	HTML
Plant manager	NK	0	0	0	A-1
Marketing Head	B-2	0	A-1	0	A-1
Prod. Mang.-met	C-3	0	C-2	C-1	C-2
Prod. M--mount	C-2	A-2	B-2	A-2	A-1
Software group	NK	NK	NK	NK	NK
Engineering	C-2	0	0	0	A-1
PT Tech Writer	C-2	B-2	B-1	A-2	C-2
Consultant	C-2	B-2	B-2	C-1	NK

Analysis

The most interesting part of the above matrix is that as the technology developed over the course of the two years represented in the graphs, the technological expertise of the company employees actually decreased because of the layoffs. In 1995, the company had one full-time person who was an expert with Pagemaker, Scanning/Photoshop, Drawing and the Web. One other person within the company had some experience with creating websites. But, because of the layoffs, in 1997, most of the documents produced were done on Word, because only two people, isolated in the mounting devices section, knew Pagemaker. And, they did not know it especially well. The product manager for mounting devices commented that a great deal of time was wasted while he and his colleague got up to speed: "When we started, we struggled because it was a learning process. We were learning the software, and it took us months to figure out that the problems weren't just the software, it was the hardware we were using, so we were thinking it all was our own lack of abilities that was getting us so frustrated and we kept struggling, and there weren't any experts, because we were the experts. So we would grow our knowledge base by just trial and error and reading the manuals and calling the info lines and that sort of thing, and we gradually just built our knowledge base to the point where we learned that the software really wasn't doing what it should be doing for our needs, and then we also at the same time started coming to the conclusion that we needed just more memory and faster machines and it's just a learning process. We learned how to become printers and publishers" (Hancock 1997). He also noted that in undertaking these publishing projects, his and others' time was not used very efficiently and he was not able to devote as much time to other projects.

This lack of literacy affects not only the time and energy expended by the people working on the documents. It also can have a significant impact on the people who view the documents, and could end up hurting the bottom line, according to the graphic designer. "When you are out there and you get something come across your desk and no one from the company is there and you look at it, you definitely have an image of the company in your hand and when they're sending out the stuff that there is sending out--

which is nowhere near the quality of what they were sending out--that definitely has an impact on the customer. Whether how many sales that makes them not get, if any, I don't know. But the way the customer perceives them, is definitely, cannot be anywhere near what it was before."

Part of the irony in the chart above is that the people who were making the decisions about document production (who would be creating the documents, what software would be used) are the people who had the least amount of knowledge about document production. The plant manager and the director of marketing had never used drawing, scanning and page layout programs, yet they were the ones who made the decision to lay off the graphic artist and, as pointed out in Chapter 3, sell the computer, scanner and software to that same person after he left the company.

That decision to sell the technology could have been catastrophic, had the graphic artist harbored any ill will toward the company or been apathetic toward their plight. Had the graphic artist not taught them-- "coached" is the term he used—about how to use the software and had he not been there to tweak the files the way they needed to be fine-tuned, the employees would have been in much worse shape in getting up to speed and producing respectable-quality documents. Or, had he not provided the many, many computer graphic files which had been stored on his computer, the company would have wasted even more money and time. "All those files, all the artwork that I had done on the computer, was all on the hard drive and they sold it to me and didn't take it off there or anything," the graphic artist said. "They didn't make backups or nothing. So they called me maybe four or five months down the line, and said, 'By the way, would you consider giving us the files that are on your hard drive--we need those'" (McIntyre 1997). Many of those files would need to have been recreated had he not been willing to help, and because of the lack of literacy on the part of the remaining employees, the company would have either had to spend a great deal of money to pay an expert to recreate those files, or they would have taken a severe hit in term of quality and man-hours lost by having it done in-house.

It was also ironic that the people deciding to lay off the graphic artist—one of the only people who was familiar with the document production technologies and the only

one fluent in all of them—were people who had no experience whatsoever with these technologies. They did not know how to use the hardware and software and didn't know what all went into creating the documents. In the end, the people who fired the graphic artist would be ultimately responsible for the creation of new documents, but neither they nor anyone else had the technological experience or design expertise to create documents. Perhaps the greatest irony is the person who was marketing director at the time of the 1995 layoffs ended up later being demoted and having to learn Pagemaker, at the cost of much personal and company time.

One final note about the matrices above: while the 1997 chart shows the manager of metering devices having gained expertise in web, scanning and Photoshop, in actuality it was a personnel change which caused this change in literacy level. This person was previously in charge of the software group and was promoted. While one would think that such a promotion would lead to more changes and more advanced use of the technology (since the person in the higher-up position now had more knowledge and understanding of the technology), in some ways the opposite was true. The promotion led to this person having more responsibilities and needing to learn other aspects of the company. As a result, the one in-house person who might have been able to develop at least a basic homepage for the company had virtually no time to dedicate to establishing a web presence for the company.

The graphs and charts above also reinforce the importance of the technical elite. It is the technical elite who have the highest level of literacy, and thus would be in the best position to make the best use and best implementation of any technology. But, because of layoffs, the technical elite in some cases were eliminated, which meant that decision-making was left to those who were not very literate.

Distribution Technology

There are two parts to getting a document in the hands of the audience: production and distribution. The above section outlines the literacy levels of the people involved in producing the documents; this section outlines how literate the people sending out and

receiving the documents were right before the layoffs and two and a half years later, when there were significant changes in the proliferation of CD-ROMs, email and the web. The following matrices illustrate the levels of literacy and their changes.

Legend for the following matrices

Paper—B=reading, C-1photocopying, C-3= complex mailing
Fax—B= receiving, sending, C= setting up lists, fax-back server
Email—A-internal email system (Lotus cc mail) B=read/send external email, C= listservs, automated
Disk—B=use a disk, C=save files to/create a disk, C-3= ability to use a disk duplicating machine
CD—B=ability to use a CD, C= ability to burn a CD
Web—B=ability to use, "read" the web; C=ability to create web site/server space to distribution.
* Note—after the first two categories of U.S. and international companies as a whole, the list of personnel involved roughly parallels the amount of power people in these positions wielded in terms of document distribution.

Table 4.3 Distribution Technology January 1995

Position	Paper	Fax	Disk	CD	Email	Web
International headquarters	C-3	B-3	C-3	B-3	B-3	B-3
U.S. Division	C-3	B-3	C-3		B-3	B-3
Plant manager	C-1	NK	C-1	B-2	A-3	0
Marketing head	C-1	B-1	C-1	B-2	B-3	B-1
Mkt prod. Man	C-1	B-1	C-1	B-2	B-3	0
Engineering	C-1	B-1	C-1	B-3	C-1	0
Software group	C-2	B-1	C-3	B-3	C-1	0 (home)
Sales	C-3	B-1	C-3	B-3	A-3	NK
Graphic Des.	C-2	B-1	C-3	B-3	A-3	C-1
Doc. Coor	C-3	B-2	C-3	B-3	A-3	0
distributors	C-2	B-1	C-1	B-3	0-B-3	0-B-3 see surv
IOUs	C-3	B-1	C-1	0-B-3 see surv 55%	0-B-3 see surv	0-B-3 see surv
Mun/Rural	C-2	B-1	C-1	0-B-3 see surve 47%	0-B-3 see surv	0-B-3 see surv
PT tech writer	C-1	0	C-1	B-3	C-1	C-1
Consultant	C-1	B-1	C-1	B-3	B-3	NK

NOTE TO USERS

Page(s) not included in the original manuscript and are unavailable from the author or university. The manuscript was scanned as received.

154

This reproduction is the best copy available.

UMI®

Table 4.4 Distribution Technology August 1997

Position	Paper	Fax	Disk	CD	Email	Web
International headquarters	C-3	B-3	C-3	B-3	C-1	C-1
U.S. Division	C-3	B-3	C-3	B-3	C-1	C-1
Plant manager	B-1	NK	C-1	B-2	B-3	B-3
Marketing head	C-1	B-1	C-1	B-2	C-1	B-3
Mkt prod. Man	C-1	C-2	C-3	B-2	C-2	C-2
Sales	C-3	B-1	C-3	B-3	C-1	B-3
Engineering	C-1	B-1	C-1	B-3	C-1	B-3
Software group	C-2	B-1	C-3	B-3	C-2	B-3
distributors	C-2	B-1	C-1	B-3	0-C-1	0-B-3 see surv
IOUs	C-3	B-1	C-1	0-B-3 ~75%	0-C-2	0-B-3
Mun/Rural	C-2	B-1	0-C-1	0-B-3 ~65%	0-B-3	0-B-3
PT tech writer	C-1	0	C-1	B-3	C-2	C-2
Consultant	C-1	C-2	C-1	B-3	B-3	C-2

Analysis:

A few things become apparent when viewing the above matrices. For one, the technologies people are most familiar with are paper based. Everyone both within the company and outside of the company knew how to read, photocopy and send a document to another person. Likewise, everyone had access to a fax machine and was able to send and receive a piece of paper via a fax machine. Floppy disk literacy was also high as everyone within the company dealing with document production and distribution had

computers with floppy drives and knew how to copy files to a disk, with a couple knowing how to operate the disk-duplicating machine the company purchased. Outside of the company, only three percent of respondents to the customer survey indicated they did not have a computer, and only one percent had a 286-level machine, with the rest having 386, 486 or Pentium-level processors. Because floppy drives were virtually standard in 386 and later machines, only one out of every 20 customers did not have access to a floppy disk. It is assumed that most all of the people with computers had the knowledge of how to access a file on a floppy. From a literacy standpoint, it is clear that paper, fax and disk would all be valid distribution media for the company, although a hard copy option would need to be made available to the customers without computers.

The other electronic distribution methods are another story. In 1995, many people within the company did not have access to a CD-ROM drive and only about half of the IOUs and municipal utilities had CD-ROM access. And, only 8% indicated they would have CD-ROM access in the next year (I've extrapolated these figures for the two years to increase to 75% (IOUs) and 65% (Municipal) , from 1995 to 1997. The REA rate, 79% in 1995, likely increased to 90 or 95% by 1997. Still, these overall numbers are low enough that if the company went to CD-ROM distribution, they would clearly need to have a secondary method such as paper. (Given the ease of accessing a file on a CD-ROM and given its similarities to floppy disk technologies, it is assumed that a large percentage—90% or higher—of those with access to the technology would have the literacy to open up a file on a CD.)

The number of people who had C level literacy—the ability to burn a CD—is not especially relevant, just as it is not especially relevant for floppy disk technology. For burning CDs and copying floppy disks to send out mass quantities of documents, catalogs, software packages, etc., the most cost efficient means is usually to contract with an outside company to duplicate the disks/CDs; consequently, it's not critical for the company to own a CD duplicator or have someone able to operate such a machine. It is interesting to note, however, that in 1997 the company did purchase a CD-ROM burner (single, not a multiple burner) in hopes of moving in that direction, at least for its sales

force. Two years later, the metering products manager said the burner was not used, and he did not even know of its exact location.

Email and Web access and literacy are what changed the most between 1995, when the move to electronic distribution was first contemplated, and 1997. These two technologies were parallel in many respects, in large part because after 1995, email and web access often went hand-in-hand. If you signed up for an internet service provider or had a T-1 or T-3 line, you typically had both web and external email access. In early 1995, many people within the company had access to an internal email system, but many did not have external email or web access at their computers (some had it at home, through AOL, Compuserv and local providers). For the most part, people within the company in 1997 had a basic level of literacy, i.e., they were able to read email, compose a message and send it to one or more persons. They did not have the technological literacy to create a more advance synchronous or asynchronous meeting space (a MUD, MOO or listserv). On the customer side, only 28% had email addresses, which meant that even if the company personnel had the literacy to set up a listserv or other means of group distribution, such a method would not have reached more than a third of the intended audience. In addition, in order to preserve the layout of a document and not just the text, the document files would have needed to be sent using an attachment form. While I did witness one person within the company upload and download an attachment and I know that he did send some software patches via email, it is safe to say that in 1995—and even in 1997—many of those who did have email access either did not have a system which could handle attachments or did not have the technological expertise to download an attached file. In short, the limited email literacy and access of the customers—and in 1995, of the company—prevented this method from being a viable alternative for document distribution.

Web access was a little more prevalent among the customers. When the survey was conducted in August of 1996, 54% of customers had web access (the discrepancy between email addresses and web access is easily explained: while a company may have access through an internet service provider, the company may have been limited in the number of email addresses that were given or the company officials may have other

reasons for not wanting everyone to have email access). While it was feasible to measure access levels through the self-reporting on the survey, gauging the actual literacy level of the customers with the technology is more difficult. However, it should be noted that 33% of the companies responded that they had a web page (although this may be a reflection not of the literacy level of the customers, but rather of the literacy level of the people the customers hired to create those web pages). More telling is that 51% of the customers noted they download documents or software on a daily or weekly basis, while 17% download monthly and another 17% download a few times a year. In short, it seems that the customers with web access were in large part savvy enough to be able to download a manual from the web, if the company chose to do that. People within the company displayed a similar level of literacy, and by 1997 most everyone had access to the web at their computers. What had changed very little was the ability of company personnel to create their own webpage. The graphics person who was laid off did have that expertise; in fact, he was hired by another company and was designing their web page in late summer of 1997. The head of the software group, who became the head of the metered products division in 1997, did have the ability to create a web page—in fact, in 1996 he put a page with a software patch to download on his own site as a favor to the customers who needed the "quick fix," but after he was promoted he was too busy to do much with web page creation.

POWER

Power is probably the most important facet to discuss, because Feenberg's radical goal to democratize the workplace is essentially about power. It is about how power should pass from the ownership/management—the holders of most of the power in the capitalist state—to the technical elite and ultimately to the workers and customers. I thus begin with a discussion of power, especially as it relates to the introduction and use of technology and electronic publishing technology in particular. I will begin with an examination of the power structure between the company and the customers, since their relationship helps explain much of the decision-making. I will then delve into some of the

decisions made and the degree of influence the ownership/management, the technical elite and the customers had on those decisions.

Finally, in this section I will discuss how this culture and attitude toward technologies was the result of the power structure within the company and how the views of technologies and decisions made ended up reinforcing the existing power structure, instead of having the technology reach its democratizing potential, as Feenberg hoped it would.

The final two sections of this chapter, Power and Culture, are necessarily intermingled. The following discussion of the power relationship between the company and the customers is naturally very much rooted in the culture and history of the company and could have been placed in the Culture section. Likewise, the Culture section will contain a survey of customer preferences and compare their preferences with the preferences/choices made by the company—and in doing so, this comparison will naturally show which group had the greatest power. The Culture section also outlines the subtle power the cultural norms and traditions exerted on the decision-making process.

Power Relationship between the Company and Customers

In order to understand that relationship and the power structure and how Feenberg's theories fit in so well with the company being studied, please allow for an important digression about the unique power structure in regards to the customer and the company. At first glance, it would seem the customers would have a tremendous amount of leverage, given that they have the power to put the company out of business by not purchasing its products. The company's practice of excluding customers from input about the decisions regarding electronic publishing and not providing the documents in the form the customers would like would seem to provide a very quick excuse for not purchasing from that company.

While the power of the dollar would seem to grant the customers power, so too would the company mission statement and stated customer service philosophy seem to even further provide grounds for elevating the position of the customer. The company

had a three letter motto: "OCV," which stood for "Outstanding Customer Value." These letters and this motto was printed on pins, posters, clothing and other various promotional materials. This motto would seem to guide owners, the management and the workers to make quality and customer service a top priority. So, why would the company keep the customers out of the loop and oppress and silence them by not involving them in the decision to move to electronic publishing? Why would they make a decision which would create a even more authoritarian power structure which would not only force the customers to obtain their documents a certain way but would also require them to purchase equipment in order to obtain those documents and spend money printing out those documents?

The answer lies in the unique economic and political situation within the electric utility industry. As mentioned before, the industry is comprised of two types of customers: investor owned utilities (IOUs; approximately 200) and municipal/rural electric associations/cooperatives/companies (MUN/REA; over 2,000). At first glance, one would think that the sheer number of the MUN/REA customers would indicate a great deal of power. Surely the company wouldn't want to risk alienating nearly 90% of its customers in making a decision, right? The complication arises in the fact that the percentage of customers does not equal the percentage of business. In other words, because these 2,000 companies are small and have a small number of customers, they represent a much smaller percentage of total sales. One employee noted that the ratio of IOU to rural/municipal business is 80-20. In other words, if the company sells 1,000,000 meters, then 800,000 of them would go to IOUS and only 200,000 of them go to municipal or rural companies. Total profit margins from each group may widen that gap. The smaller companies are likely to primarily purchase residential meters, which are low-tech, low-cost meters which have very small profit margins (as mentioned in Chapter 3, more than one member of management admitted to me that they were actually losing money on these residential meters because of the highly competitive business; this in fact led to the company moving its residential meter manufacturing operations to Mexico in order to reduce labor costs and make a profit on the devices.) The rural/municipal companies have fewer retail and manufacturing customers and thus purchase fewer of the

more high-tech, high profit brand of meters. The result is that these smaller companies may produce no significant profits for the company being studied. In addition, the technical support costs—which include documentation—may contribute to the company losing money. For example, the cost of printing and mailing a technical manual update to a company for an electric meter may cost $10.00. The per-meter cost of an IOU with 1,000 of those type of meters would be a penny per meter. The cost per meter for a rural electric company with two of those meters is $5.00 per meter, proportionally 500 times the cost vs. the IOU. The same is true of technical support calls. The IOU with the 1,000 meters may have a problem configuring the firmware in the high-end meter and the worker at that utility may end up on the phone for 30 minutes with an engineer or marketing person, at the cost of roughly $15-$20 to the company (when factoring labor and benefits). Again, the cost per meter is very small, only one or two cents per meter, while the same call from a rural electric company will be proportionally much higher. Add to that the fact that the technical support calls from the rural/municipal calls might be longer and more frequent, because of the lower level of technical expertise at these smaller companies and the lack of experience with each model. If the rural company only purchases and services a few meters, its technicians will not familiarize themselves with the product well, meaning they may need to call the company after they forget the advice the manufacturer gave them during their last call—a problem which was cited by the marketing personnel.

This is why the manufacturing company instituted a new technical support policy during my study, a policy which involved purchasing a service contract for technical support calls. This move was made partly in line with similar policies held by competitors, and it was made partly also to recoup the losses from providing support. Of course, it also had the effect of turning away these smaller customers. Using the per-meter basis mentioned above and reversing the flow of money, one case easily see how paying, for example $500 for technical support is not significant for an IOU with 1,000 meters, since the 50 cent per meter cost on a $500 meter is not a major deterrent. For the rural/municipal company with two meters, paying $250 per meter for technical support is a major cost.

Yet another reason not to provide first-rate and free service and documentation is the ways in which customers purchase the meters. Typically they send out bid requests to the major manufacturers, and these manufacturers return bids, based on the type of meter and volume requested. The low bid, of course, usually wins, especially when the rural/municipal company is linked with a governmental body. One marketing person, in an informal conversation with me, complained that "with most customers (but not all), it doesn't matter what relationship we have had or the level of support or customer service we provide, if the other guy's bid is a nickel lower, we'll lose the bid." As a result, the company has reduced incentives to provide the best or most customer-oriented documentation or documentation distribution method. The main incentive is to cut costs to allow the company to bid low and to make profits. This reliance on awarding contracts by bidding, while lamented by the company, does give more power to the company. All the company has to do is provide the low bid, not an excellent service history. It is out of the need to provide customer service that the company relinquishes its power, sacrificing its time and resources and position of authority in an effort to satisfy customer needs.

Given this scenario, one can now understand the power structure within the electric meter industry and how it affected the decision to move to electronic publishing. The owners of the company had been losing millions of dollars and were exerting pressure on upper level management to get into the black. The upper level management saw that the quickest means for doing so was to cut personnel costs and services and to focus their business on the larger clients. This led to the decision to move to electronic publishing and laying off the technical elite and middle management who were involved in servicing customers and in the writing, designing, printing and distributing of company documents. This move meant that the TE and middle management --the people who could have helped craft less authoritarian means for implementing the new electronic document technology-- were silenced. Since they were a voice for the small customers that they worked with, the small customers were also silenced. These smaller customers were further silenced because the company did not seek direct feedback about electronic publishing, since the company was in effect wanting to get rid of the lower level, lower-profit customers in the first place.

That is how a customer (in this case, a MUN/REA)—who yields great power in many company and industry settings—holds virtually no power in the setting which I am studying. And, it is why the role of the customer is so interesting in this study and part of the reason why I wanted to include the customer when analyzing the power structure, the decision-making process, and, fitting with Feenberg's critical theory of technology, the potential for the technology to be adapted to fit the culture's social and economic needs.

Internal and External Power in Document Production and Distribution Decisions

The above discussion of customer power is borne out in the chart below, which illustrates the level of power as it is related to document-related decisions. The chart provides an overview of the decision-making and decision influencing power exerted when it came to the method(s) used to distribute content, what material would be included on the company's website and which software package would be used to create documents (ex: Word, Pagemaker, Quark, Microsoft Publisher).

Table 4.5 Levels of Power and Document-Related Decisions

Position	Distribution method	Web page content	Choice of pub. software
International headquarters	H	H	0
U.S. Division	H	H *	H
Plant manager	H *	H	H
Marketing head	M	M	H *
Technical elite/support	L	L	M
consultants	0	M	L
distributors	L	L	0
IOUs	L	L	0
Mun/Rural	0	0	0
Consultants	0	L	L

H—High. These people were capable of making the decision
M—Medium. These people's opinions were sought and significantly influenced the decisions
L—Low. These people's needs might have been considered somewhat and they might have rendered some unsolicited advice.
0—Zero. These people were informed of the decision after the fact.
*-- Indicates person/group which actually made the decision

Analysis

The above power chart is surprising in some respects, not surprising in others. Naturally, in a hierarchically-organized international company, one would expect that the bulk of the power rests at the top and the amount of power to make or affect a decision decreases down the ladder. It makes perfect sense for the plant manager to have the

power to make a decision about what goes on at his/her plant, what hardware and software is purchased, how documents are produced and distributed and who produces and distributes them. Of course, those lower down, such as the marketing head, would generally have less power in almost any organization, with those lower down yet—such as a document coordinator or graphics manager—should be next to lowest on the level of control, right above the line workers who have nothing to do with document production/distribution and who have no expertise or experience in those areas whatsoever. It is also not surprising that workers outside of the company should not have a great deal of power. A person who is being contracted out—and thus with little loyalty or responsibility for negative consequences--would not receive much power in any company.

But, while the hierarchical organization of power is not surprising, it is surprising that the customers would have so little influence when it came to decisions to change the methods of distributing documents. In many companies with a high focus on customer satisfaction, the cliche "the customer is always right" becomes a maxim, a philosophy to follow when making decisions which will concern those customers. In essence, while the president of a company has the power to make a decision, he or she must bow to the wishes of the customer in order to gain revenue and set an example to the employees. In the end, it is the customer which holds the power. But in this setting, despite professing a strong customer orientation, the company made no plans to survey the customers or contact any of them prior to implementing an electronic means of document distribution (they were interested in seeing the results of my survey after the fact, but the results of the survey came over a year after the decision to lay off the graphic manager and move to online publications). They did not talk to their biggest clients to see if they would have the computer capabilities to make this move. They did not talk to their customers to see if they would prefer an electronic method. Such a move—had it been implemented—could have had disastrous effects, from both a financial and a public relations standpoint. A rebellion from the customer base could have resulted in the need to print all the documents which were distributed online and send to customers. This dual publication approach would have been costly. In addition, the fact that the company did not solicit

feedback from the customers beforehand, along with the frustrating lag time between when they needed documents and when the company likely would have been able to supply hard copies of all of those documents, could have caused many customers to be upset with the company. Such frustration would not only have hurt the company's image, but in the long run, would likely hurt the company's bottom line as these customers may have flocked to competitors. The irony is that in the end, the ownership/management group's continued stranglehold on power would end up hurting that group the most, and they would very likely over-react to a customer outcry, meaning they would need to give up even more power than they would have originally by seeking the input of the customers. In a way, the holding on of power to an extreme level would cause the end result Feenberg wished for: a democratization of technology-related power.

The other surprising outcome from this power matrix is revealed when combining this data with that of the literacy matrices. The following bar graphs illustrate the combinations of power and literacy as they relate to the document production and distribution decisions. For the purposes of these graphs, I have combined Porter's definition of electronic publishing and Kalmbach's description of the evolution of publishing technologies, from print to electronic documents. Porter distinguishes between two types of electronic writing, that which is produced by a computer (but intended to be printed off) and that which is designed to be viewed online. (As mentioned in Chapter 1, the company would be blurring those distinctions by sending out documentation electronically, but documentation that was intended to be printed out.) Kalmbach sets up a publishing continuum, which begins with letterpress printing, which has a fixed page, fixed text and which is a fixed document, to networked hypertext (in essence, the WWW), which has a virtual page, virtual text and is a virtual document.

What I am doing is combining their definitions and adding in a separate category to account for the company's desire to produce electronic media (in this case, the company was considering sending out a catalog and documentation on CD which was intended to be printed off). In doing so, I create a four-part taxonomy of document production and distribution:

1) Print (produced on a computer)/mail distribution

2) Electronic media (to be printed off)/mail distribution
3) Electronic files (to be printed off)/network distribution (email/web/intranet)
4) Electronic hypertexts/network distribution

I have separated out these four categories to make four graphs, each one illustrating the level of both power and literacy relating to that means of document production and distribution. These four graphs and the corresponding categories I described above are not identical to the literacy and power charts in the literacy and power sections of this chapter. I have chosen to take this approach because 1) a more detailed breakdown of document production/distribution literacy was needed in the literacy section, while such a breakdown of production/distribution for power was not needed; 2) identical, combined graphs would have been somewhat redundant; 3) these new categories tie in more closely with the overarching questions about document production and distribution and electronic publishing raised in Chapter 1.

Ideally, those with the most power would be those who are most knowledgeable about the decisions being made, so positions which have long power bars should also have long literacy bars. But, that is not what the following graphs reveal.

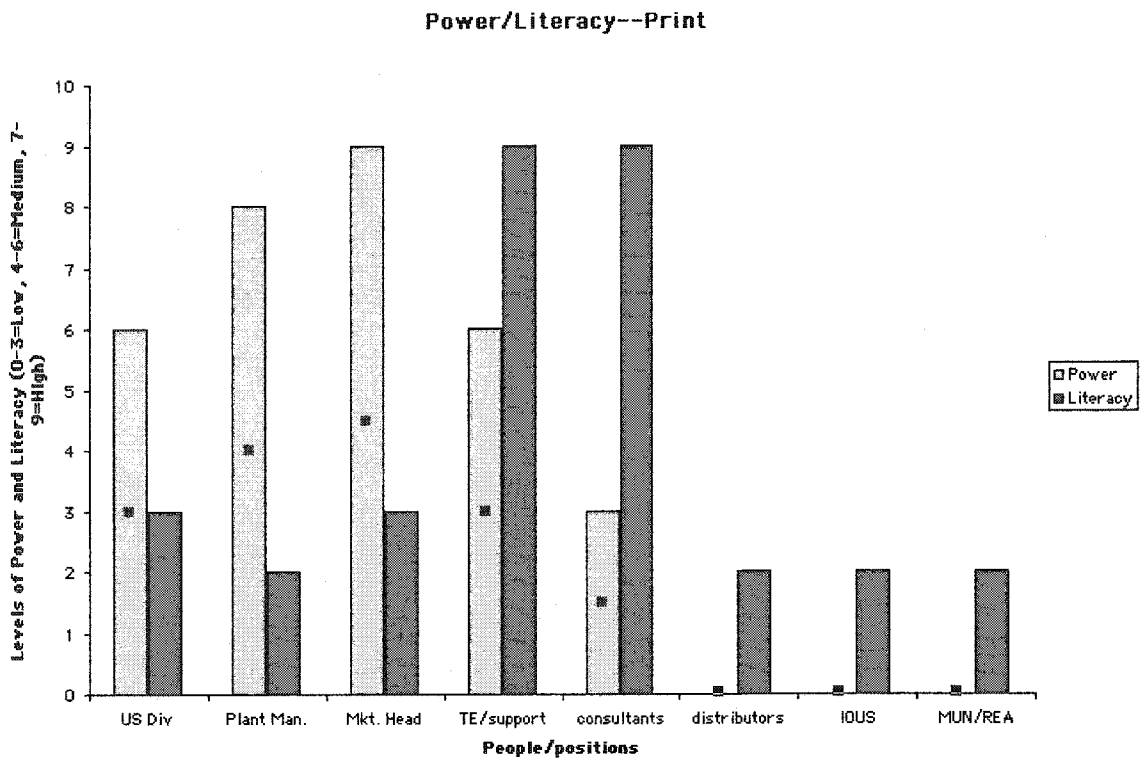

Figure 4.10 Power-literacy graph--Print

For this chart and the ones which follow, I use the power criteria mentioned before—0=found out after the decision was made, 1-3 (Low)=perhaps made some unsolicited suggestions, 4-6 (Medium)=these people's opinions were sought and influenced the final decision, 7-8 (High)=these people had the power to make the decision; 9=these people made the decision). For literacy in this graph and the ones which follow, I roughly follow the breakdown used in the literacy section—0 is no access to the technology, 1-3 describes the level of access, 4-6 includes the levels of basic skills (using/reading) and 7-9 is advanced literacy (writing/creating). For this graph, 1-3 described the person's ability to use Microsoft Word to publish basic documents (since some product schedules and other documents were done using Word), 4-6 described the person's ability to use a page layout program, and 7-9 described the person's ability to use page design principles, graphics and page layout programs and printing experience to produce professional, camera-ready copy.

Discussion

This graph covers the document and production methods through early 1995. Because the documentation was largely produced in-house and covered only the products designed and manufactured at that plant, the bulk of the power for print document production and distribution decisions rested with the plant manager and the head of marketing. The other U.S. divisions could have had some say in the print production technologies if uniformity and exchange of documents were a priority. While the final say in matters such as the choice of publishing software (Pagemaker, in the case of the company) was left to the marketing head, the technical elite—the graphic artist before he was laid off—was consulted and made recommendations which were mostly followed. Because the documents were printed, the distributors and customers did not even know and did not likely care what technology was used

This power/literacy relationship shown in this graph makes organizational and practical sense . While one would like to see the highly literate graphic artist have the power, the final say about what programs and hardware/software is purchased, it is to be expected that the ultimate decision would rest in the hands of the marketing head, who was responsible for the budget. In reality, the graphic artist seemed to have numerous and current software packages, leading me to believe that his requests were never or seldom turned down. Of course, all of this changed after the layoffs of 1995. Suddenly, no one in the company knew anything about publishing, short of doing a document in Microsoft Word. And, the marketing head and plant manager made the decision to sell the publishing hardware and software. In short, those with power to make these publishing-related decisions had a very low level of literacy, a dearth of knowledge. Such a discrepancy between literacy and power could have been very costly, as mentioned before.

Electronic media/mail distribution

The following chart shows the relationship between the knowledge/literacy to create electronic media (disks, CD-ROMs) and the power to make decisions about that method of distribution.

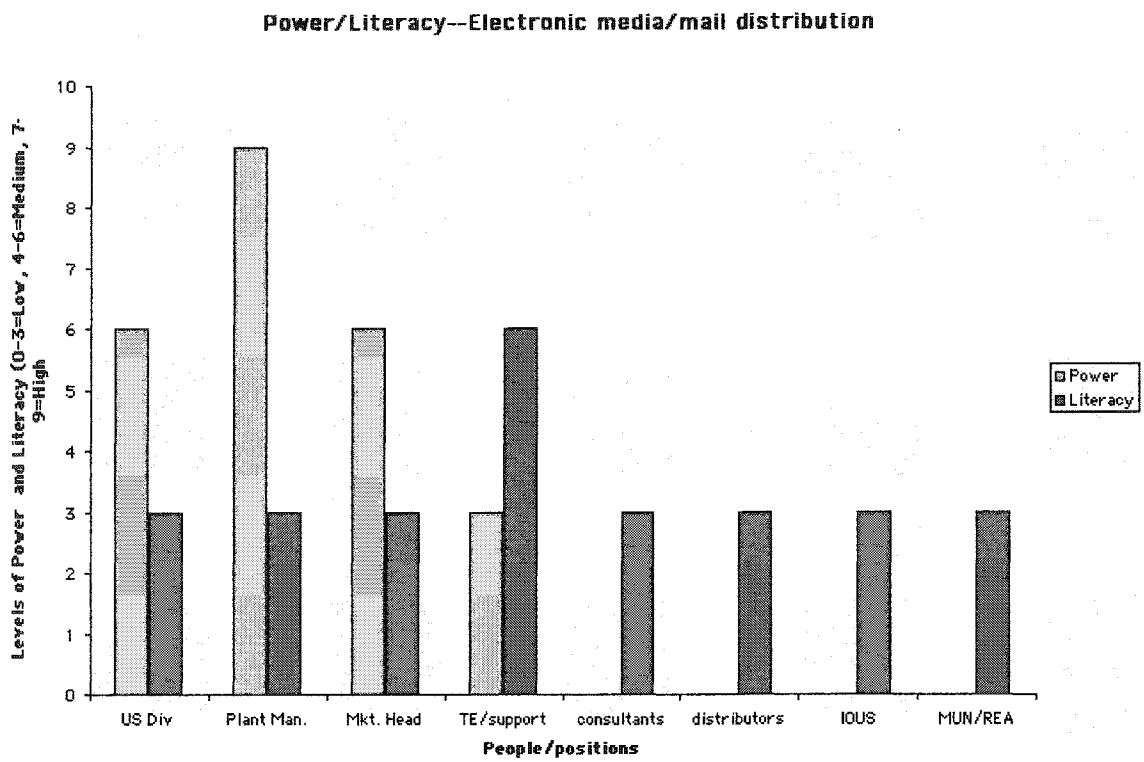

Figure 4.11 Power-literacy graph--Electronic Media/mail distribution

A level of 3 for literacy means the person was able to copy a document file onto a disk and put that disk in the mail (Naturally, all except for a few REA/MUN utility companies had computers to do this, and most all of them would have had the basic knowledge of how to retrieve a copy from a disk and make a copy). A level of 6 indicates a familiarity with disk-duplicating hardware/software, and a level 9 indicates the access and ability to burn a CD-ROM. A more complex breakdown, shown earlier in this chapter, illustrated the percentage of customers who had CD-ROM drives to be able to retrieve files (69%).

Once again, while there is a discrepancy between literacy and power, it is not too far out of line, nor is it unexpected. And, as mentioned before, since electronic media would require mass duplication, typically it would be contracted out, so the plant manager, for instance, would not need to know about the intricacies of burning a CD-ROM. The one discrepancy that does exist is that many of the people who would be using a documentation CD-ROM, the customers, had a 0 level of literacy—no access to a CD-ROM and 0 power to influence the decision about receiving the documentation only through that medium. Feenberg hopes that technology be used to help give more power to workers on the lowest rungs (customers, in this case), but in this case the technological decision only furthers the power of the company, since distributing the documentation via CD would have forced some customers to purchase that technology.

Electronic files/network distribution

The disparity between power and literacy becomes especially evident in the following graph, which is concerned with networked electronic files. A 0 literacy level means the person did not have access to the Web or did not have an email address, while a 1-3 level indicates the level/percentage with access. Roughly two thirds of IOUs and REAs had web access, while one third of MUNs had web access. Only 27% had email addresses. A high level of literacy in this category means that the person is able to work with a server/web in order to place files to be downloaded. Clearly, those with the power to make decisions regarding network distribution of documents were not the ones with the expertise and experience with the technology. The plant manager, for instance, had no experience with placing files for download on the web (although he did have basic web access), but he was the one who could have made an edict to go solely with electronic distribution of documents. Conversely, the technical elite and the consultant—the only people with the know-how to undertake this form of electronic publishing--were not even consulted, but were just informed after the fact about the decisions that were made. The marketing department head travelled to meetings with other similar heads at the branch in Illinois, but no technical elite or consultants at the local branch were invited to voice

opinions or attend those meetings. Ironically, those with low literacy levels held all the power. Those who knew about the technology were left out of the loop. And, again, the customers who would be the people forced to use this technology, wielded no power in this situation.

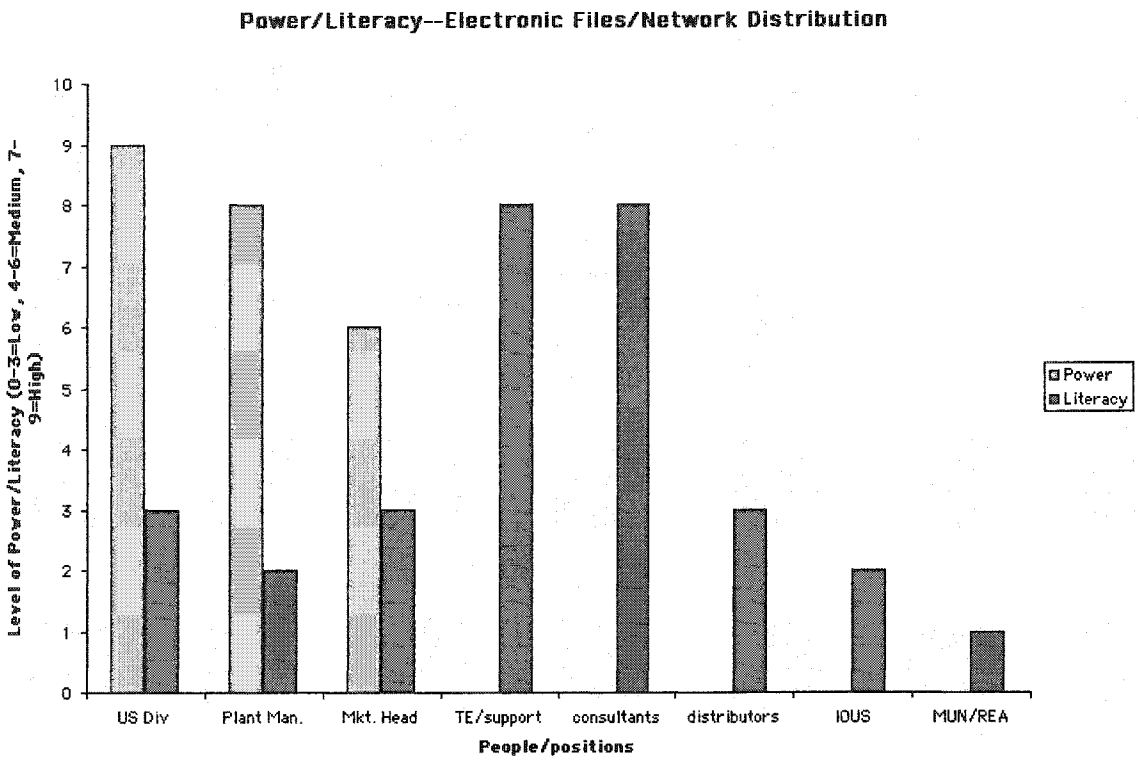

Figure 4.11 Power-literacy graph--Electronic network distribution

Hypertexts/network distribution

This final graph shows the furthest end of the electronic publishing, producing and distributing virtual documents with no fixed boundaries. Instead of having a downloadable text, Microsoft Word or Adobe Acrobat file, this type of documentation would involve the use of hypertext, which might have internal links to other related documents and graphics or support information or it might have external links to sites which could provide other useful information.

NOTE TO USERS

Page(s) not included in the original manuscript and are unavailable from the author or university. The manuscript was scanned as received.

173

This reproduction is the best copy available.

UMI®

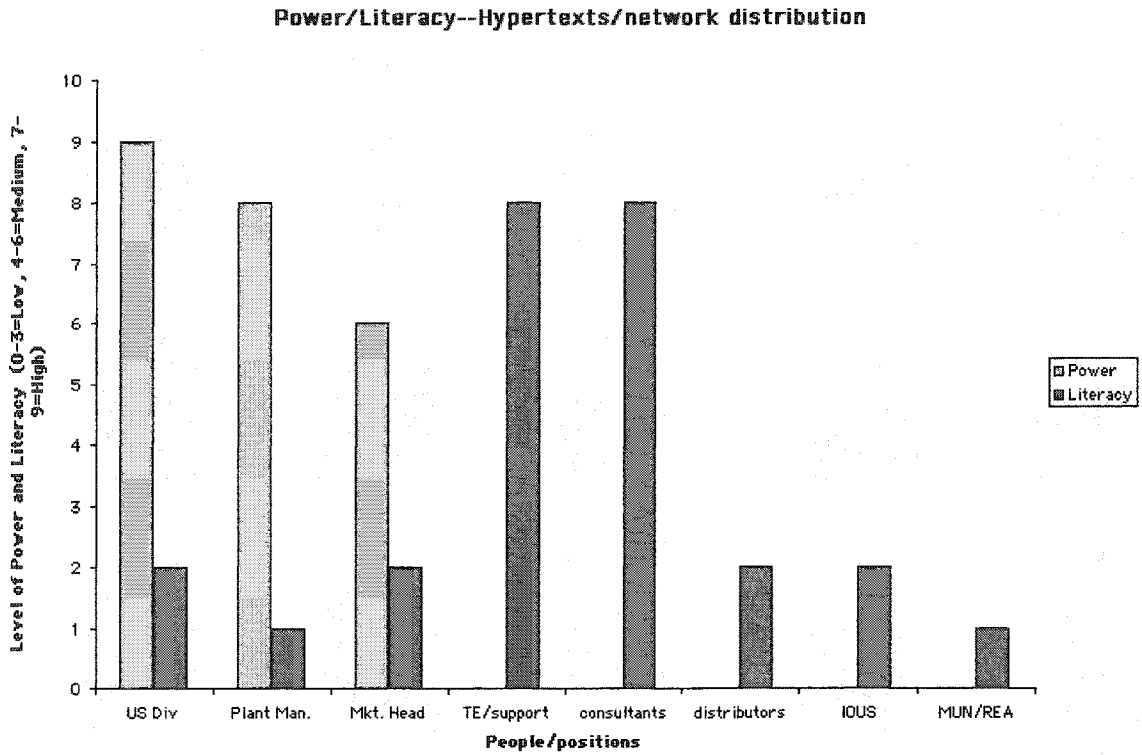

Figure 4.13 Power-literacy graph--Hypertext network distribution

A similar definition of literacy was used for this graph as for the previous graph. However, the previous graph focuses more on *distribution*—the ability to set up a server/page/system for delivering documents. This graph is more concerned with *production* , the ability to create hypertext pages. An IT person, for example, may be able to set up complex server system for document distribution but unable to make a good webpage, while a technical communictor may be able to make a good web page but not know the intricacies of server setup.

As one can see, the people with the most power, in general, are those who had the least amount of literacy. Those with the highest level of literacy were among those with the least amount of power. In short, the technical elite had very little power to make decisions which related to their areas of expertise. The owner/management class, which had virtually no expertise or experience with document production and distribution, was

the group making the important decisions. The customers, which would be most affected by the decision, in general, did not have a high level of technical literacy, and did not have the power to influence a decision which would ultimately rely on their technical literacy. Needless to say, the power/literacy differential shown in this graph is not the ideal scenario.

Feenberg notes that Lenin believed that there would be a necessary transition time during which the technical elite were relied upon (see Chapter One), with the assumption that TE would serve the needs of the workers. Lenin recognized the importance of these people in the survival of the economic system. Such importance was apparently overlooked by those in power in this case. What happened in this situation was that the owner/management remained in power and ignored the technical elite, to the point of removing them from the company. Such a move solidified the power of the owner/management—but the consequence is that they were unable to carry out their plans. Without people with the know-how to start an electronic publishing system, the company ended up doing nothing.

(Had the owner/management been more insightful—or Machievellian-- they would have charged the technical elite with the task of implementing an electronic publishing system before any firing took place).

Power, Interactivity and the Web

This subsection of the Power portion of the chapter addresses the power and interactivity levels evidenced in its web pages and the web pages of its competitors. I first provide an overview of the power/interactive-related features of the sites, and then in comparing the level of interactivity and power afforded to the customers, I work off of the interactivity taxonomy used by Ramey (2000) in her article, "Guidelines for Web Data Collection."

Table 4.6 Technological features of websites

	Email WM	BB	Chat	contact info list	Online orders	Comment form	Email To co.	Links For users
Corporate	N	N	N	N	N	N	N	N
US Branch 1st	N	Y*	N	Y	N	N	N	Y
US Branch 2nd	Y	N	N	N	N	N	Y	N
Competitor 1	N	N	N	Y	N	Y	Y	N
Competitor 2	Y	N	N	N	N	N	Y	N
Competitor 3	Y	N	N	N	N	Y	Y	N
C. Tribune '98	Y	Y	N	Y	Y	Y	Y	Y
Apple 2002	N	Y	N	N	Y	Y	Y	Y

* There was a linked button for a "Forum," but that page was never developed, and it wasn't clear if indeed this was intended to be a bulletin board-like forum or some other format

Guide to chart:

WM=webmaster, BB=Bulletin Board, Chat=real-time conferencing, Contact info list=list of contact info of people/positions within the company for assistance, Online orders=ability to order products online, Links=links to other related sites for more information

The corporate website was the one put up in February of 1996. Branch 1st is the first form of a webpage which was made for the company in 1996 but never publicized, and the 2nd version is the one put on the web in 1997, spearheaded by the Illinois branch. Three of the competitor sites were also analyzed, as was the interactive page of the Chicago Tribute for March 20, 1998 and the current Apple Computer site.

While the Apple and Chicago Tribune sites naturally serve different purposes and audiences, it is clear to see how these sites are more user-centered. They place much emphasis on the interaction with the company/site. This is in contrast to the corporate web site, which only provided a "What's new" section and a "Company Profile" section. The first planned web site for the U.S. divisions of the company was very user centered, as one could tell simply by looking at the title of the page ("Solutions Center") and seeing the various link buttons: "Forum," Products and Support, Custom Page, Locations, Hot Links, Career Track, Virtual Campus. Unfortunately, this site was never publicized to customers, and the replacement was much more public relations oriented than customer service oriented. The competitor sites were not much better (as much as the competitors followed each others' lead with product development, it should not be surprising that their websites are also similar. In fact, had a competitor started offering documentation, online ordering and other customer support services on their web pages, this might have put stronger pressure on the company being studied to follow through with plans to enhance its website with these features.

The level of interactivity and power is also borne out when using Ramey's taxonomy. She creates several categories which delineate the relationships with the designers, users and the site.

1) User to Designer (passive user information such as log data, cookies; active information such as emails to webmaster, responses to questionnaire)
2) Designer to User (more passive impersonal response or active personal replies)
3) Designer to Group (follow up questions to feedback, results of questionnaires, etc)
4) User to User (personal response to bulletin board posting, ad or link)
5) User to Group, Group to user (bulletin board/chat/forum/listserv discussions)

These different categories cover a continuum of relationships, levels of interactivity and roles of the user and designer. In the case of the designer collecting web log data, Ramey notes that the site is and "inanimate product," the site creator is an "analyst" and the person surfing the site is a "subject" (404). While this is a greater level of interactivity than not collecting or analyzing the data at all, it is easy to see how this scenario is not

user/group centered. In the designer to user and designer to group situations, one can see how both the reader and the designer begin to see themselves as "collaborators" (405). In the user-user, user-group and group-user environments, the users see themselves as "co-creators" of content and members of a community; the designer takes on the role of "enabler," while the site changes from a product to a "setting," a location of community interaction (406).

Ramey cautions that the types of interactivity need to match the goals of the site. The Encyclopedia Britannica site, for example, as a reference tool and a repository of carefully screened, factually accurate material, may have very low levels of interactivity, simply using analysis of user log data to perhaps alter the navigation patterns to help users find information. On the other hand, an informal site serving largely as a sharing site for, say, Beanie Baby collectors or frequent flyers, should focus much more on building a community.

Table 4.7 Power/interactivity between webpage and user

	User-Design	Des-user	Des-group	User-user	User-group
Corporate	x				
Branch 1st		x	x		x
Branch 2nd	x	x			
Competitor 1	x	x			
Competitor 2	x				
Competitor 3	x				
C. Tribune	x	x	x	x	x
Apple 2002	x	x	x		x

Clearly, the corporate branch was not designed with interactivity and customer power in mind. The first US site did have several interactive possibilities, but again, this site was

neither fully developed nor publicized. The second US site was not very interactivity, nor were those of the competitors.

The Chicago Tribune and Apple site show how the company sites could have been much more interactive. They could have had bulletin boards for discussion among users on how to handle certain problems with meters or what meter would be best suited for a particular application, listserv subscription, comments form/email for webpage, comments/email for questions about products, ordering capabilities, survey for viewers of site, as well as services such as documentation, an FAQ and listing of staff. This latter possibility was actually discouraged from being on the company site, since the company was doing what it could to reduce the number of phone calls the engineers and product support personnel were receiving.

All of the technologies above would have not only increased interactivity, they would have increased the power of the customer. Through their email/comment form input and through their discussions with other customers on the bulletin board, the customers might have been able to have a greater voice in product and support decisions. This indeed would have realized Feenberg's goal of using technology to democratize the workplace. But, such democratization was not on the agenda of those in power, the owner/management group.

CULTURE AND THE IMPACT OF SPEED, IMAGE, CONVENIENCE AND COST

While the people in various positions did indeed exert power to different degrees, it was the culture and the document-related priorities inherent in that culture that largely dictated what decisions were made. This section discusses the power of the culture, how its history, norms and values influenced literacy, downsizing/deskilling and especially power. One of Webster's dictionary definitions of power mentions "influence," and indeed it was the culture and the priorities outlined below which directly and indirectly influenced much of the decision-making as it related to document production and distribution. This section discusses these priorities and then examines the results from

the distributor and customer survey about document distribution preferences. It concludes with a comparison of customer and company preferences and how these preferences played into the decisions and actions taken.

Speed, Convenience, Image and Cost

Throughout the interviews conducted, the internal memos, the surveys and my observations, four factors came to the fore in determining what method of document distribution was preferred by the customer and the company. These four factors—speed, cost, image and convenience—to a large degree dictated the decisions made by the company and how successful the distribution method was/would have been with the customers. As expected, the priorities of one group—the owner/management group—were not necessarily the priorities of the other groups, such as the technical elite and the customers.

Speed

Speed is of perhaps the greatest importance to the customers. First of all, speed was valued because in the past, the documentation for products actually lagged behind the shipment of the products. Yes, the product was shipped before—sometimes months before—the documentation was sent. The reason? Because of competitive pressures, internal company and promises made by marketing and sales to customers, the new metering device was often shipped as soon as possible. But, because there was seldom a technical writer on staff (see earlier chapter), the people writing the documentation were by and large engineers. These same engineers were devoting all of their time to working on final details of the product and testing the device right up until the time of production. Consequently, they were not able to write any documentation until after the meter began shipping—and then, of course, there was further lag time in the printing and mailing of the documentation. Little wonder then that speed was valued by customers. I learned of this need shortly after I first began working as a consultant to the company. When interviewing customers about changes they would like to see in the catalog, I received

several unsolicited comments from customers about documentation and the need to get it in their hands more quickly.

"The need for speed" is also valued by customers after the documentation is first sent, since replacements are often needed. Because of the myriad of complex electronic devices which require documentation (which means the utility might have many sets of documentation to keep track of) and the potential to lose/damage documentation in the field, it is not uncommon for customers to need to obtain new documentation. But, as is typically the case with the use of documentation, the user doesn't realize that the documentation is missing until the time that documentation is needed. Consequently, when the customers wanted documentation, they wanted it *now*. Under the traditional methods of shipping paper documents, that usually meant a lag time of 2-4 days, instead of the 2-4 minutes often desired. The fax was often used (Stetler, Martin), but if the need for documentation arose after hours or during the weekend or at a remote location away from a fax machine, the lag time was too long.

Naturally, a web-based documentation archive would provide the quickest means for the customer. The customer could log in to the internet and download the file within the hour, if not within minutes, depending upon the length of the document and the speed of the modem. Or, if the documentation was in HTML format, the user could skim through the documentation even more quickly without having to wait for a download. Of course, a page or a complete set of documentation could also be delivered via email—and in fact, such a method was employed by the technical elite in 1996-97, although the most common method was to copy/paste needed portions of the documentation text into an email.

The method quickest for the company depended upon many factors, though, such as who was doing the work and how much the company was willing to spend. Printing 1,000 copies of a 100 page manual might require over a week to get back from a local print shop. A similar order, done through submission of an encapsulated post script (EPS) disk copy (similar to PDF; print to file) to a company called Docutech, could have as short as a three-day turnaround. The turnaround on a disk order was generally one to two weeks, dependent upon the number of copies and how much the company wanted to pay to have

the order expedited. A similar turnaround time could be had for CD-ROMs, although the rush job on such an order in 1995 would virtually double the cost. The time for posting a file to the web was dependent upon who would be responsible for posting it. In the case of software patches, the software manager in 1996 was able to post a software patch to his personal website within the hour of completing the patch, and then send emails with that web address to customers who needed the patch ASAP. But, if the documentation was put on the company-wide site which was maintained by an internet firm, then it may take a week or more to get permissions to put the documentation on the site and for the internet person to post the file to the site. If the document were to be converted to HTML, the lag time could be a week or more longer. In the end, the U.S. divisions did end up going with an outside provider which managed the site—and, partly because the site was under the main control of the provider, with the branch in Illinois serving as an intermediary between the provider and the branch I studied, no documentation was ever put on the website. Some promotional literature was placed on the site (see appendix and discussion later in this chapter) for one of the meters, but no documentation was ever included. So, one could make the argument that the web method was the slowest means of distribution for the branch, although had the company hired a full-time technical writer with web experience or had the part-time technical writer (who had web experience) focus on establishing an HTML or downloadable file archive, and given the tech writer the green light and server space, the files could have been posted very quickly.

The following chart outlines the change in speed from a move from paper to another means of document production/distribution. For the customers, the chart reflects the gain or loss in how quickly they could access documentation. For the company, the change is in the amount of time to distribute the documentation. For the technical elite/consultant, the time change is the greater/less amount of time it would take to prepare the document for this form of document distribution (ex: it wouldn't take any more time to produce a disk version of the documentation, since the document would be saved on disk anyway; email and Web preparation time may be greater to accommodate the need to change the size or format of the file to fit that method.

Table 4.8 Speed

	Paper	Fax	Disk	CD	Email	Web
International headquarters	=	+	-	+/-	+	+
U.S. Division	=	+	-	+/-	+	+
Plant manager	=	+	-	+/-	+	+
Marketing head	=	+	-	+/-	+	+
Technical elite/support	=	=	-	-	-	-
consultants	=	+	=	=	-	-
distributors	=	+	-	-	+	+
IOUs	=	+	-	-/+	+/-	+/-
Mun/Rural	=	+	-	-/+	+/-	+/-

+ adds to speed
= speed stays roughly the same
- requires more time to receive or produce the document
+/-= depends on computer capabilities. Those customers with the technology would notice a shorter lag time, while those without the computer capabilities to handle the files would experience little or no change.

Image

Not surprisingly, the image of the company was another important factor in some of the decisions made. However, it was surprising that image did not play a greater role in the decisions made. One would expect a company to value its image very highly, especially one which is a multinational, multibillion-dollar firm. This is a company, too, which had a visual standards manual which spelled many things out exactly, from the colors and fonts used down to how to number a sub-sub-sub head Ex (4.3.2.1) in a product manual. But, while the image may have been valued by the graphic artist and

management at other branches of the firm, the branch being studied did not seem to place a great deal of emphasis on image. For one, as mentioned before, there was a rush just to get the documentation out the door. In doing so, some of the standards were sometimes not consulted, and at other times ignored. The layoff of the graphic artist was perhaps the most obvious instance of a devaluing of image. The graphic designer, who worked on a freelance basis for the company after he was laid off, felt the quality had diminished because of a lack of experience both with the software and design principles. Asked if there was a dropoff, he replied, "Most definitely. Most definitely. Very much so. Like the mounting device catalogs. They could be a lot better quality. They're coming up. They're getting better and better and better, but they could be a lot better quality if they used different procedures, spent just a few more dollars on the production end, which of course they don't want to spend, if they used an experienced page layout person that understood how is laid out" (McIntyre 1997).

Two years after the layoff, the decrease in quality led the former marketing director to remark, "Down deep, I still wish we had it [the graphic designer position]. I think we did better looking things and I think some of us used our time more efficiently" (Hancock 1997).

The graphic artist also commented that the company stopped having their business cards professionally printed.

"When you are out there and you get something come across your desk and no one from THE Company is there and you look at it, you definitely have an image of the company in your hand and when they're sending out the stuff that they're sending out--which is nowhere near the quality of what they were sending out--that definitely has an impact on the customer. Whether how many sales that makes them not get, if any, I don't know. But the way the customer perceives them, is definitely, cannot be anywhere near what it was before . They're even printing some of their business cards on a laser printer. When you hand somebody your business card, what kind of impact does that have on you? If you don't even know XX Company is here and you're in some other city, you're thinking, is this a business out of his garage or what? It has to have one hell of an impact.

I don't deal with their customers enough to know what the impact actually is. It has to have tremendous impact" (McIntyre 1997).

The fact that the company was devaluing the quality of printing work is also evident by the fact that they were photocopying much of the existing documentation and product schedules instead of having new documentation printed. Also telling was the fact that the company was strongly considering providing literature via a fax-back server. The quality of fax printing is far from first rate (especially in 1995 and on fax paper) and clearly a step down in many respects.

While the graphic artist lamented the downturn in printing quality—the poorer stock of paper, lack of four-color work and use of laser printing and photocopying instead of offset printing, it was his work as a consultant that saved the company from producing work that also suffered in design quality. , He ended up doing much of the pre-press work which brought the quality of the page designs up. "Basically I put it [a document] together in a form that will print and get the printing done for them, basically handle it from the disk stage on. They give me the disk and I do the output and the page layout, as far as how it has to be laid out to print. Make sure the little things that need to be done get done, the little things that you need to get done to make a job best quality for what they're working with. The things that you don't know you don't know unless you work in the printing industry, production--type things (McIntyre 1997).

The graphic artist's last comments, of course, have echoes of the earlier literacy discussion. Literacy in the document industry is not just about knowing Pagemaker, which the product manager was becoming familiar with. It is knowing page layout and design principles and pre-press preparation needed to make a document look professional. The graphic artist's layoff left a vacuum in this literacy, a vacuum which ironically he ended up filling.

Originally I had planned to do document analysis of some of the product schedules and documentation produced before and after the graphic artist was laid off; however, his continued involvement ended up tainting any such analysis, since it became impossible to determine what exactly the engineers/product managers were writing/designing and the many changes and improvements he made—and, because of his

changes, some of the post-layoff documents were virtually indistinguishable from the pre-layoff work, again, outside of color/paper stock/printing quality issues. In addition, there were not really enough long documents produced after the layoff to be able to make much of a comparison.

A final note: while the company may not have placed a high emphasis on the image of its documents, it should be noted that the customers did not seem to place an especially high significance on image. Customers, engineers and marketing personnel all commented that because of the nature of the utility industry and its workers—largely males without much education beyond high school—the customers placed a higher priority on availability (see speed section above) and readability (in writing some documentation, I was told to write at about the eighth grade level).

Changing the medium=changing the image of the company?

The move to electronic publishing would have also changed the image of the company. No longer would the image of the company be reflected solely through the print materials sent out. Instead, the image of the company would be affected by the customer's own printer quality (disk/CD distribution), fax printing resolution and the quality of the image on the web or through an email system. For items which needed to be printed off, the image of the company would probably take a hit, since the printing quality would be lower on the customer's inkjet/laser than on an offset, professional press.

Table 4.9 Change in image

	Paper	Fax	Disk	CD	Email	Web
	=	-	-	+/-	-	+/-

+ enhances image
= image stays roughly the same
- detracts from the image
(+/-= depends on customer)

However, for some customers, the company's move to electronic publishing and the increased convenience (see below) of obtaining documents could help the company's image, making it seem more customer-centered or more cutting-edge. For that reason, I've indicated a +/- for CD and Web distribution methods, since some of the customers with access to the Web and the desire to have documentation/catalogs on CD would respect the company more for its move to electronic publishing. Other customers, however, might be put off by the move to electronic documents.

Convenience

Convenience is a tricky issue, because what is convenient for one group may not be convenient for another. As shown in the literacy section, having documentation on the web would be very convenient for some people or companies—especially IOUs-- having it only available on the web would be a major inconvenience for others—especially MUNs-- who do not have web access and would need to upgrade their computers and get internet service. Email was likewise convenient for some people, although again, only 27% of the customers surveyed had email access, and a significant number of those people either lacked the email software or knowledge of downloading attachments to make this a truly convenient option. The combination of lack of internet service and downloading difficulties made email distribution the least convenient means of electronic network distribution for most people.

On the electronic media distribution side, the multiple disks required for some documents and the catalog (some images would have taken up nearly an entire disk) would have made the disk option the most inconvenient option. While most everyone would have had a disk drive (although some with 286 computers and a few with 386 computers might not have had a 3.5 inch drive), keeping track of 20-50 disks for documentation and a catalog would have been a nightmare for many customers, and the problem of disks going bad in or after shipping would have multiplied the problems with this media. For the 69 percent of surveyed customers with a CD-ROM, this media would probably have been preferred. For companies like IOUs which must keep track of and store a great amount of documentation and who already have CD-ROM drives on their computers, the CD format is perfect. It is also idea for companies which send their employees out in the field with laptop computers, since the worker could easily store and access the CD-ROMs for the various product documentation when needed. For those without CD-ROMs, again, this would mean a computer hardware purchase.

Table 4.10 Convenience

	Paper	Fax	Disk	CD	Email	Web
Branch	=	+	-	-	-	+
Marketing head	=	+	-	-	-	+
Technical elite/support	=	+	-	-	-	+
consultants	=	=	=	-	-	-
distributors	=	+/-	-	-/+	-/+	+/-
IOUs	=	+/-	-	-/+	+/-	+/-
Mun/Rural	=	+/-	-	-/+	+/-	+/-

+ adds to convenience
= convenience stays roughly the same
- requires more time/effort
(+/-= depends on computer capabilities or other factors)

It should be noted that with all of these electronic means of document distribution that the level of convenience may be largely dependent upon the quality of the customer's printer. Customers who might have a first-generation inkjet printer would likely be very frustrated with having to wait a few hours for a 100-page manual with complex graphic to print—and that is if the computer didn't crash or the printer didn't jam or run out of ink in the process of printing a complex, multi-megabyte document, which indeed would be lucky in 1995. Customers with high-end laser printers, of course, would encounter fewer problems.

For many customers, the most convenient option would be to remain with paper. With a hard copy, the customer could put the documentation on a shelf or in a bookcase with other documentation and, if the person has a logical organizing system, simply retrieve the documentation when it is needed. There is no requirement for internet service. There is no need for upgrading a computer to have disk or CD-ROM access. There is no worry about misplaced or damaged disks or CD-ROMs. There is no problem with file compatibility. So, for many utilities, especially the MUN utilities which are the least likely to have CD/internet capabilities and literacy, paper would remain the best option.

But what would be most convenient for the company? That, also, is dependent upon many factors, which is why a "+/-" mark is given. Convenient for whom is the big question. If the plant manager allowed one of the product managers to create and maintain a local website with downloadable documentation, then that person would be able to upload copies fairly easily, perhaps simply saving in multiple formats (Word, Word Perfect, PDF) and loading them onto server space provided by a local internet provider or by one of the other branches. Making an update to a catalog would have involved simply uploading the file to the website, a feat which could have been performed in under a minute with a few keystrokes. Compare the ease of such a method with printing off 2,000 copies of the update, stuffing 2,000 envelopes, printing off 2,000 mailing labels, attaching those labels and taking them to be mailed (this ignores the effort expended by the customer in going through and replacing the updated page in the catalog, or the effort expended by both the customer and company when such an update got lost or

misplaced). Similarly, if there were an email listserv with all the customers on it, sending an update to that listserv would be very easy.

The electronic media distribution would be much more inconvenient—in fact, more inconvenient than paper in most cases. The one-page update to the catalog, for instance, would hardly be worth the hassle of having disks or CD-ROMs duplicated by another company—and this is before all of the stuffing/mailing work mentioned above. But, if the company were to put all of its documentation and catalog on one, solitary CD-ROM, while there would be a great deal of effort needed to compile that CD, but there would be a great saving of effort in simply sending the disk rather than a bulky catalog and variety of documentation.

Cost

While the other factors—speed, image, convenience—are all important, none of those three comes close to influencing the document production and distribution decisions as much as cost. And, to a large degree, all of these other factors overlap and can be boiled down to cost. The speed at which documents were produced and distributed, the image projected by the company, the convenience to the customers and company were all dictated by how much money the company wanted to spend. And, while the culture of the company, the power structure of the company and the electronic literacy (or lack thereof) of the owner/management all influenced the decision to move to electronic publishing (and ultimately, the inability to actually make this move), the main rationale cited for changing document production/distribution was cost. Running millions of dollars in the red led to downsizing and the decision to save money by not sending printed documentation. Lack of people and monetary resources led to the company's inability to implement this plan. Small budgets prevented many utility customers from being able to have the hardware and software and internet connection needed to ensure the success of an electronic publishing system.

Before going further, I want to examine the different types of document distribution methods considered by the company and compare the costs—for both the company and the customer-- of those methods.

Table 4.11 Cost

	Paper	Fax	Disk	CD	Email	Web
Branch	=	+	-/+	-/+	+	+/-
Marketing head	=	+	-/+	-/+	+	+/-
Technical elite/support	=	+	-	-/+	+	+/-
consultants	=	=	=	=	=	=
distributors	=	-	-	-	-	-
IOUs	=	-	-	-	-	-
Mun/Rural	=	-	-	-	-	-

+ cheaper
= roughly the same
2) more expensive to distribute/produce or receive

For the company, the electronic network distribution methods would definitely be cheaper. By making the documentation available only through a fax-back, email or the Web, the company would not incur any printing costs. There would be setup costs for all of these technologies, however, and the cost of setting up an maintaining a website is why I indicated Web distribution with a "+/-" for the company.

For the electronic media, the cost would be dependent upon several factors. For one, the reproduction costs of the media would need to be considered, which could range from 25 cents for disk distribution to more than $1 for CD distribution at the time, depending on how many copies were ordered. The ultimate determining cost-benefit factors would be how much material was included on the media and how often updates

were needed. If the CD were to contain the catalog and all the documentation and other product literature, the CD could be a huge cost savings. However, if the CD or disk just contained one set of documentation, or if there needed to be frequent updates sent out, then paper could be less expensive, depending on the cost of the printed product (photocopies vs four-color pieces).

For the customers, however, there is little question that an electronic distribution method would be more costly for them. A paper copy of a 200 page catalog from the company would be free. That same catalog may cost several dollars in paper, toner and personnel hours when that catalog is printed out, hole punched and put into a three-ring binder.

Costly decisions by the company

Ironically, while cost was cited as the reason for making many of the cutbacks and moving to electronic publishing, several of the decisions made actually ended up costing the company money. One example is a combination email/bulletin board/faxback system that the company paid for but never used. The company hired a computer information student from Purdue as a consultant to create an FTP/ bulletin board system for customers to be able to download documentation and software patches. On the system there was also a fax-back option. The student had the system up and working, but didn't end up advertising it to customers. The former marketing manager said it wasn't professional-looking enough (Hancock 1997), while the software manager in charge of the student said it was too complex (Martin 1997), and the student said it was in part because the software manager got promoted to another position and the project was thus given very low priority and not modified (Karner 1996). The student spent several weeks, approximately 150-175 hours on the project, at $12 per hour, meaning the company essentially wasted about $2,000 for a system it did not use. The student had at first recommended a $199 system that could have been modified in a couple days (the system the student designed was built from scratch), but the company did not choose this option. Again, the student said his supervisor was too busy with other projects—in large

part because of the extra burden taken on as a result of the layoffs—to look at the product to see if it would work.

During the same time the company spent over $50,000 (Karner, Reilly) to develop a specialty metering product which never ended up being marketed. "They spent $60,000 for a consultant [to write the software for the product] and this whole program is being trashed. They wasted "$60,000, on top of all the marketing information they put out. They made brochures, color brochures—those probably cost thousands of dollars...They've got a lot of problems. They think they need to hire a consultant from Arthur Anderson to come in there and kick butt" (Karner 1996). A consultant was hired through the Illinois office to create those brochures.

Ironically, the decision to cut the printing press and graphic artist position also ended up costing the company money. In fact, the company had originally planned to cut the printing operation several years earlier. When a reorganization time came, the graphic artist/manager was informed that his printing group was going to be cut, the result of a recommendation from the finance department. The graphic artist complained that the finance department made such a decision without seeking any of the relevant data from the printing division. He pleaded to the president of the company, who issued him a challenge to prove that keeping the printing operation in house was saving money. When the graphic artist presented the numbers to the president, he said, "My God, you guys are making a lot of money [in saved printing costs] back there. There's no reason to shut down the department" (McIntyre 1997). The department stayed operation for several more years, until the last round of layoff—even though the printing operation was still a money-saver. "They shut it down anyway, because there was continued pressure from industry, from manufacturing trends, that "in-plants" were not the thing to do anymore...there is no question in my mind that it is costing them a bunch of money not to have that press department in house. It (the cost) was astronomical whenever we went outside. And I kept all those numbers and we looked at what we were paying inside. It was more than double...It cost them money. Everybody said they knew it cost them money. That's what the people above me told me. But that's what they had to do because that was the direction that the company wanted to go. That they wanted to not

do anything that wasn't core to making the meter" (McIntyre 1997). The former marketing head also confirmed that the move to shut down the printing operation was not based upon a cost-benefit analysis.

A cost-benefit analysis would have also shown that cutting the graphic artist position was not a logical choice from a monetary standpoint. The graphic artist ended up being hired on as a consultant, and would only comment "I'm getting money out of this." On top of his consulting fees, one has to also factor in the lost time and productivity of the engineers and marketing personnel who needed to learn how to do publishing work. As mentioned in the literacy section, getting up to speed on the publishing related technology alone took a great deal of time. Plus, not having the experience with the technology, the employees wasted a great deal of time working with older computers and Microsoft Word before they realized they did not have the software and hardware necessary to do the job (Reilly 1997, Hancook 1996). With this time wasted and the consulting fees, the graphic artist contends the company actually ended up spending more money because of his layoff: "If you look at the labor of the people on board, the energy they're spending on getting the stuff done they didn't have to do before, I would say definitely, yes, it's costing them money" (McIntyre 1997).

CULTURE AND POWER: PREFERENCES OF THE COMPANY AND CUSTOMERS

As mentioned at the end of the Power section, When looking at the power structure, it's important to first examine the preferences of the customers and the company. Who valued what things, whose values were considered most when decisions were made, and whose values ultimately prevailed?

The following diagram illustrates the priorities held by the company and the customers, and shows where those values overlapped—and where they didn't.

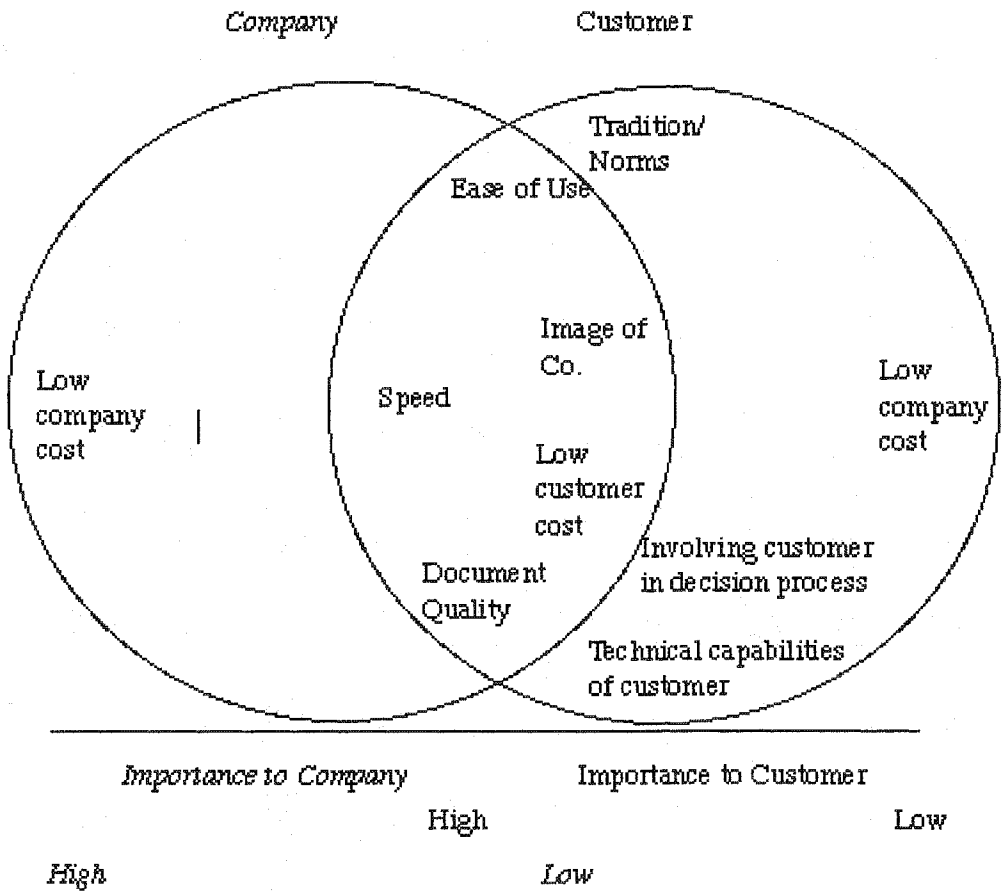

Figure 4.14 Importance of features to company and customers

Based upon the comments made and the actions taken, it was clear that company cost was the main force driving the company to consider changing its document production and distribution. While it may have thought that maintaining its image was important, as discussed earlier, the printing methods used and the choice to lay off the one person most responsible for the company's visual image indicates otherwise. While speed may have been somewhat important, the convenience, the ease of use of the different methods considered was not, and in the chart above I have listed "Involving

customer in decision process" and "Technical capabilities of customer" as actually being outside of the company sphere, because, quite honest, it wasn't even a low priority for the company—it wasn't a priority at all, and didn't even appear on the company's radar scope. The cost of a new document distribution system for the customer—in terms of internet access, hardware/software upgrades or laser/inkjet printing costs—was also not important to the company.

Of course, to be fair, the company cost of producing and distributing documents was probably not a high concern for the customers. Judging from the preferences listed in figure 4.15, it seems as if many customers were willing to incur the cost of printing out documentation, which is why I put it closer to the middle.

The customer priorities naturally varied from customer to customer, but for the most part, they seemed to value speed the most, the ability to get a needed document when it was needed. Document quality was also important (several customers made some criticisms of previous documentation)

Customer vs. Company preferences

In light of the aforementioned power structure and the different cultural values in regards to speed, convenience, image and cost, it should not be surprising that the values and preferences of the company and its customer base would be at odds. To determine the preferences of the customers and the effect of electronic distribution on the customers, several questions relating to these factors were included on the survey of customers referred to in Chapter 2. Before going into this survey, though, I will present the results of the survey of distributors, which contained both their preferences and well as their predictions for the customer preferences.

Distributor survey—preference results

In terms of document distribution preference, no one medium stood out as a clear favorite. Using the reverse order point system described in the customer survey section (

rating of 1 = 6 pts, 2= 5 pts, etc.), the computer disk option tallied 49 points, barely edging CD-ROM and Email, both with 48 points. Paper was a close fourth with 44 points, one point better than World Wide Web. The fax-back option was last with 39 points. The closeness of these numbers reveals a definite split in preferences, especially when the range could have been as great as 65 points (78 if all had selected one option and 13 for the low option) instead of a mere 10 points.

More revealing was the distributors' expectations of customer preferences. When asked to predict how their customers would rank the items, they selected paper as their first choice with 59 points, followed closely by fax-back with 57 points. The numbers were significantly different after that, with third place belonging to computer disk (48 points), fourth place to CD-ROM (38 points) and fifth to Email (34 points). The World Wide Web was estimated to be the least preferred customer option, as it scored 29 points. Again telling was the point breakdown: eight of the 13 distributors predicted paper would be their customer's favorite choice, while two distributors picked paper to be their customers' least favorite choice. Six distributors--nearly half--guessed that the World Wide Web would be their customers' least favorite choice.

Another key question was, "If your first of second electronic choice were provided, how important would it be for Company X to provide you with hard copies of the documents as well?" For the distributors, 46 percent said it would not be important, and another 31 percent said it would only be somewhat important. Only three of the 13 (23 percent) said it would be important or very important. However, the distributors recognized that their customer base might think differently. All but two (84%) predicted that their typical customer would respond "important" or "very important."

Equally telling were some of their additional comments. One distributor noted that the manufacturing companies will be the ones who will influence the ways documents will be distributed and the technology that the distributors and customers have. In other words, if the manufacturing companies decide to distribute their catalog on CD-ROM, then the companies will then purchase a CD-ROM drive. In a similar vein, a different customer commented, "We've had other manufacturers use the World Wide Web, and it's worked pretty well. It can cut down tremendously the amount of time waiting for a

document." That same distributor noted that a move to electronic distribution will translate into a lot of printing for both the distributor and the customers. Yet another distributor remarked, however, that the speed of getting the manual--it is sometimes needed instantly--offsets the printing disadvantages: "I don't care if we need to print out copies in order to get them to customers--anything so we can get them quicker."

Customer Survey—Document Distribution Preferences

One of the most important questions for the customers had the participants rank the order of the medium they would most want receive documentation in, with a rank of 1 indicating their most preferred option. Because many of the respondents gave the same number for some options (multiple choices for 1 or 6, for example) and others only listed their first or second option, I used a reverse scoring system, giving 6 points for a #1 choice and 1 point for a #6 choice. The added up totals for the 87 surveys were as follows, with the greatest point totals indicating the most popular option.

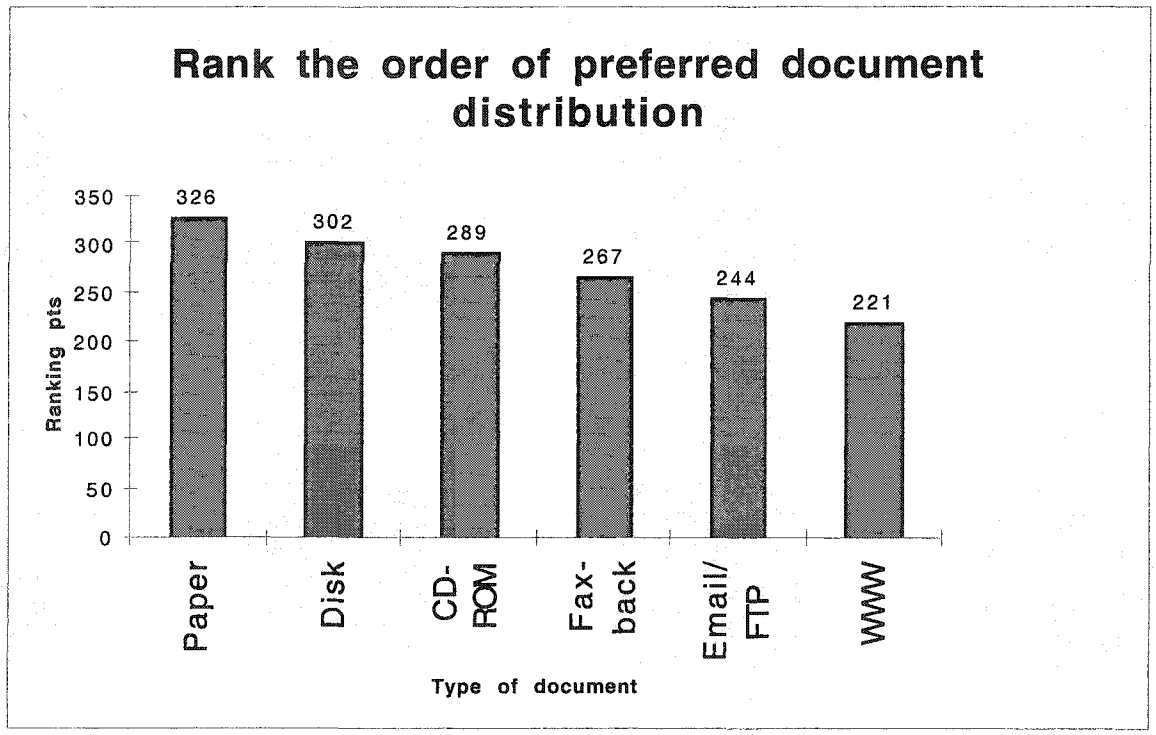

Figure 4.15 Customer document distribution preferences

This closely resembles the order predicted by the marketing director: Paper, Disk, Email, Fax-Back, CD-ROM, WWW.

The results reveal more than just the fact that paper was the most preferred option and the World Wide Web was the least preferred option. The order above is seemingly in an order of tangibility. In other words, the more tangible, the more easily to hold the item in one's hand, the more that method of document distribution was preferred (with disk being ranked ahead of CD-ROM because not everyone had a CD-ROM).

Ironically, this order of preferences is also almost identical to the ranking of costs of distributing the documentation. Paper copies cost the most to duplicate, handle and mail. Disks are also very expensive to duplicate and mail and to replace because of disks going bad in transit or in the customers' care (This happened for 5-10 percent of the disks, according to the software manager). CD duplication costs are slightly cheaper, because more documentation and the product catalog could be put on CD and because of the smaller number of errors/disk failures. The fax-back and email systems are less expensive because no duplication and mailing costs are involved; the cost is in the original set-up (depending on who sets up the server and the complexity of it, a fax-back server could be cheaper or more expensive than an email system). Lastly, the WWW would be the cheapest, once a web presence was already established. The document could be uploaded and downloaded as a Word or a PDF file, requiring minimal time and cost on the company's part.

Table 4.12 Customer wants vs costs

	Customer Wants	Cost of Production/Dist.
High	Paper	Paper
	Disk	Disk
	CD-ROM	CD-ROM
	Fax-Back	Email
	Email	Fax-Back
	WWW	WWW
Low		

A time vs. wants chart would be virtually identical to the one above. It takes the most time to send out a paper document to a printer to have it reproduced, followed by CD and Disk, depending on the number of CDs and disks to reproduce and whether they were reproduced in house or commercially. Again, the WWW and other electronic versions would be the quickest to distribute; a webmaster could receive and post the html, Word or PDF files within minutes.

Some other inferences can be gleaned from the survey results. While the survey indicates is that paper is still the number one option, it is not the runaway favorite as much as was expected. Also, while all of the utilities surveyed has a fax (see results in the following section on literacy), the disadvantage of the technology--the cost of transmission and the often poor quality of documents, put it back in the middle of the

pack. No doubt the lower percent of access to the WWW helped that option be at the bottom of the list.

A more telling statistic was revealed when looking at the data closer, however. The first choices of the respondents paints a clear picture. 36 people responding to that prompt put paper down as their first choice. The next closest first choice was CD-ROM, at 16, followed by the WWW with 13. Bringing up the rear were computer disk and fax-back servers at 10 responses and email with 6.

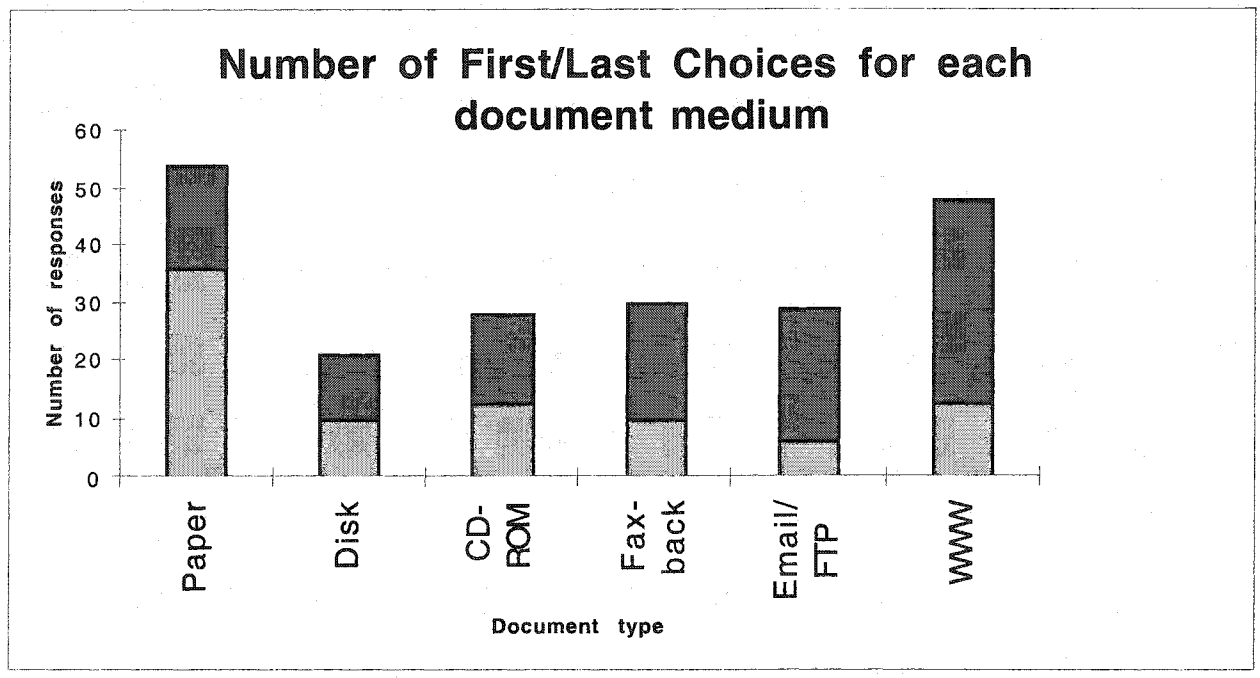

Figure 4.16 Customer document distribution preferences--first/last choices

This number adds up to 91, more than the 87 respondents, because some people put a 1 beside more than one option.

This multiple response was also true of last choices, since some people gave multiple least favorite option responses. These last choices were also very revealing. The WWW led the way with 35 people indicated it would be their least preferred option.

Electronic mail was next at 23, followed by fax back at 20, Paper at 18, CD-ROM at 15 and computer disk at 11. That paper came in at the middle of the pack was surprising, and seems to indicate that a significant percentage of the people would rather not deal with paper, preferring to handle electronic storage of their documents. So, while in overall terms paper was the most popular and the WWW was the least popular, there was a significant number of people who preferred the WWW and didn't want paper.

To better determine this, I included a question, "If your first or second electronic choices were provided, how important would it be for the company to provide you with hard copies of the documents as well?" 36% circled "Not Important", and 34 % circled "Somewhat Important." Only 15% indicated "Important" and 7% "Very Important", with 8 percent not answering or answering "Don't Know." So, less than 25% of the respondents indicated it would be important or very important to have paper copies.

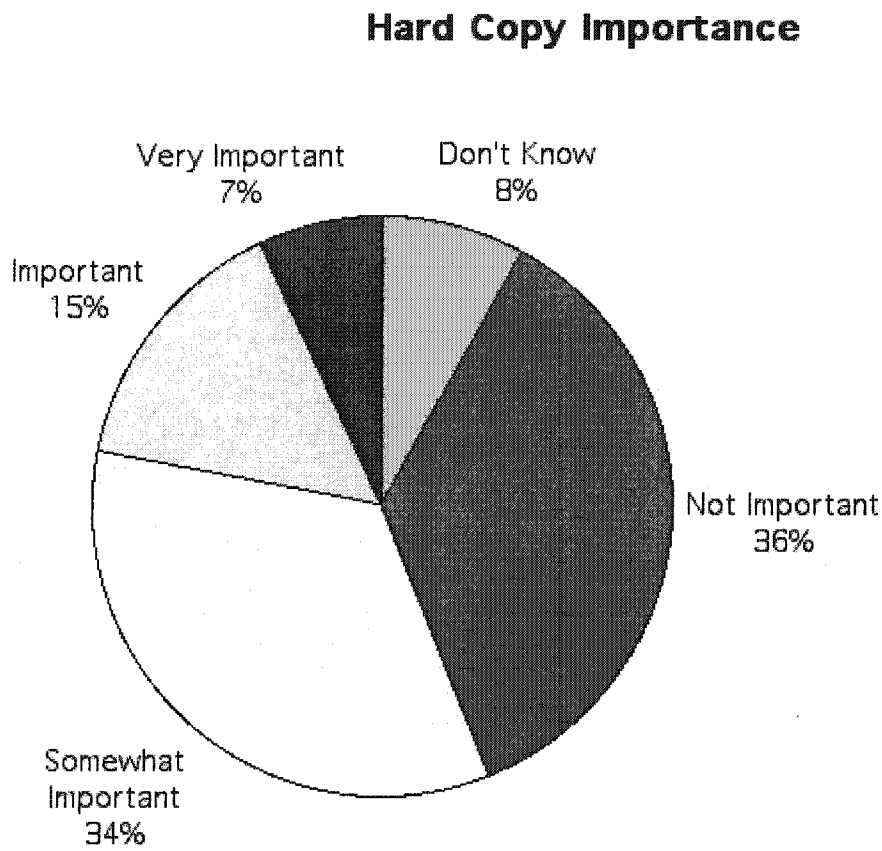

Figure 4.17 Importance of hard copy to customers

The permanence of the medium is one key element in determining both its advantages and disadvantages. The more permanent, fixable the media is, the more comfortable some people feel with the medium. On the other hand, the permanent the media, the more expensive updates will be. If we were to place the items along a continuum, for example, Paper would probably be the most permanent, followed by a CD-ROM, computer disk, a fax-back server and email and the WWW. It is no coincidence that continuum often parallels costs. While the variables like the number of different documents being produced and the number of copies needed for each document naturally affect price, paper is often

one of the most expensive means for producing and distributing documents. Once a WWW site is established (which can be very costly initially), making copies of documents available to customers is very cheap for the company. Of course, the cost to the customer often works in a reverse order---Web access may not be cheap, just as fax transmission requests can be expensive. Printing out hard copies from the Web, a disk or CD-ROM can also be expensive, while the paper costs virtually nothing for the customer to receive and store.

Analysis

What do these survey results mean? They mean that there is a real split in the customer base, with one camp wanting electronic documents and not needing or wanting paper and the other camp strongly rejecting moving toward electronic document distribution. Such results would lead the company toward one of three choices:

1) continue with paper only distribution and incur the higher costs and time sacrifices and risk alienating customers who would prefer electronic documents

2) provide both electronic and paper copies to mollify both camps. Providing both would mean even higher costs in production (especially because of the labor involved in creating multiple versions), although these costs could be offset by reduced paper and labor expenses in sending replacement copies.

3) proceed with electronic only distribution and risk alienating customers who need or want paper versions. As mentioned earlier in this section, those customers were ones who were most likely municipal/rural (and municipal in particular) companies, the ones who were the smallest and whom the company wanted to devote the least amount of time and money toward satisfying.

What the company planned to do and what the company ending up choosing to do were two different things. They planned to distribute documents only online, but they ended up continuing with paper only distribution, as I will discuss in the conclusion

FINAL CONCLUSIONS

The company had a goal in early 1995: reduce personnel costs by laying off document-related employees and reduce printing costs by moving to electronic publishing via CD-ROM or the Web. The results of this goal by summer of 1997? Increased personnel expenses because of higher consultant fees and inefficiency of remaining employees, and increased printing costs because of the need to outsource for printing. What went wrong? The answers lie in this chapter, in the literacy, power and culture of the customers/company/industry.

The people who had the power to make decisions did not have the document-related literacy to make the best decisions, and the result was another literacy-related dilemma—the people left to create documents were the people without document technology literacy. Without expertise in document publishing, the employees were only able to produce documents with the help of the person they laid off. Without any electronic publishing literacy, these same people were unable to even begin moving toward a CD-ROM or web publishing system. And, had an electronic-only system been implemented as planned, the lack of literacy of the customers may have made the system a failure, which would have cost the company money and its image.

The cultural force of the "bottom line" within the branch (given the operating losses and possible elimination of the branch, probably the most important force) led to the desire to slash positions for short-term gains. But, these cutbacks led to mid-term and long-term expenses which far outweighed any minor gains netted in cutting the one position (graphic artist) which could have led to cost savings and success in any electronic publishing venture.

This scenario led to vicious circles: because those with literacy were given only minimal power, the illiterate ones in power made the wrong choices and laid off the ones with literacy. The result was a power structure which had even less literacy, which led to more bad decisions. In the same manner, the focus on cost-cutting led to the eliminating of the document-related personnel and equipment, and their elimination led to greater document costs, which consumed even more of the marketing department budget,

resulting in the need of even greater cutbacks and the prevention of putting resources into electronic publishing. Eliminating these positions also meant everyone else needed to pick up document production duties, which meant they had even less time to consider electronic publishing.

Had the company kept the graphic artist and hired someone on a part-time basis to do their electronic publishing—and given power to these people to make or influence decisions—the result could have been much different. As I will discuss in the final chapter, a technical writer with experience in electronic publishing could have created a document production and distribution system which would have reduced company costs and accommodated the varying needs, wants and literacy levels (giving them more power) of the distributors and customers. While the former benefit would have added to the bottom line by saving money, the latter could have added to the bottom line by increasing customer satisfaction, which could have resulted in more first-time or repeat business.

CHAPTER 5: CONCLUSIONS AND IMPLICATIONS FOR TECHNICAL COMMUNICATION, TECHNICAL COMMUNICATION PEDAGOGY

ANALYSIS AND DISCUSSION OF DECISIONS MADE

To a large degree, this dissertation is the study of one company's planned move to electronic publishing. In that sense, then, the dissertation is a study of a failure, since no electronic publishing system was ever implemented. No web presence for the branch was ever established, no formal email, fax-back, disk or CD-ROM distribution method was ever created, and no documents were prepared for electronic distribution.

So, what happened? Why was nothing ever implemented? And what could have been done?

This chapter builds on the findings in Chapter Three and Four and goes further in answering those questions. In addition, it delves into how these findings have implications for professionals in the field, how the situation at this company can have some bearing in other settings. The chapter then explores how the situation at this company may help direct, in some small way, the teaching methods and content in technical communication courses in the 21st Century. The chapter concludes with suggestions for future research.

Why was the electronic publishing plan a failure?

Many factors contributed to the failure to implement an electronic publishing system. As outlined below, many of these factors were cost-related. However, two of the biggest factors are ones which have been stressed throughout the dissertation: an instrumentalist view of technology and a lack of literacy among the people making the key decisions. The following sections detail those theories of technology and the path the company took.

Instrumentalist view of technology

In Chapter 1, I noted how Feenberg used the examples of AIDS patients and the French Minitel users to show how technology literacy and an exercise of power helped transform technology and realize the democratization potential of that technology for the good of the user. On the contrary, this study exemplifies how technology is more often used. It illustrates how technology is often implemented by the ownership/management to further their power and to increase efficiency and profit. In this approach, they espouse an instrumentalist view of technology, seeing it as a tool which operates independently of social and political factors. The company owners/managers were planning on using electronic publishing because it worked in other industries, and thought that it could be transferred to their industry and likewise reduce expenses. The errors in this viewpoint began to show as the company struggled—and ultimately failed--to implement the electronic publishing technology and force it on their customers.

Had the company had a more enlightened view of technology, following Feenberg's critical theory of technology, they would have likely saved time and money, along with perhaps using technology in a way which the customers would have bought into. This study shows how the technology could have taken a path which involved the users and technical elite more, yet how those possibilities were negated by downsizing and the lack of an internal technical elite who could have served as an advocate for the users/customers. In shifting power from the management/ownership more toward the

customers, the democratization of the use of the electronic publishing may have yielded interesting new EP possibilities. But, that never happened.

So, was the electronic publishing plan a power victory for management/ownership? Hardly. All of the company priorities mentioned and charted in the previous chapter were not attained (saving money, increasing speed, etc.). In terms of document distribution, the move to electronic publishing was a nearly complete failure; in the end, management admitted that they would not be able to only distribute the documents electronically, that they would need to provide paper in addition to electronic copies. This service naturally adds to the cost of document production, instead of saving money. On a production end, also, by the admission of the people creating the documents, the cost of producing the documents increased while the quality decreased (had they actually produced an electronic version, too, the cost would have been even greater). The image of the company was sacrificed, and documents were produced more slowly, especially during the first several months of transition time.

Who actually came out ahead in this decision to move to electronic publishing? Not the company. Not the owners or managers. And surely not the people who lost their jobs in the downsizing. Ironically, its seems the people who emerged victorious were the customers, the ones who were given no power and no input into how the technology would be used. As the survey indicated, the majority of them wanted to continue to have paper copies of company documents. Because of the failure of the company's electronic publishing plan, they got their wish.

Recognizing the facets of a critical theory of technology would have led the company to recognize the role of the technical elite is paramount to the success of a new technology within a company and important in prevented owners/managers from taking a instrumentalist view. Admitting the importance of the technical elite and giving more power to this group might have led to greater successes.

Poor literacy

As one can see from the above points, one problem led into another problem. The financial instability led to prioritizing problems which led to layoffs and understaffing. These problems led to one other result: a low level of electronic publishing literacy. As discussed in Chapter Three and Chapter Four, the people who had the highest level of literacy were precisely the people who were laid off. That meant the people with the power to make electronic publishing decisions did not have the literacy or the advice from those who were literacy to make sound decisions. In addition, because of understaffing, those who might have otherwise tried to gain electronic publishing literacy through reading about it and undertaking some EP projects did not have much time to gain that knowledge and experience.

And, the question remains about whether these people gaining such literacy would have been cost-effective and efficient for the company. Perhaps the best example of the impact of literacy can be seen in case of the mounting products manager. He was left with the task of creating a new catalog for the products in the year after the graphics manager was laid off. He struggled through Microsoft Word before realizing it could not do what he needed it to do. After "wasting" this time, he then went through the learning curve of gaining experience with Pagemaker. Even after becoming somewhat proficient, he admitted that he likely took more time than the graphics manager would have with current projects and produced lower quality work. His literacy level was still relatively low, because even though he achieved proficiency with the software, he was still not literate with design principles.

Having a graphics manager do this work would have freed the mounting products manager to do other work, and the end document would have been more attractive. And, the graphics manager either would have had the know-how—or could have gained it relatively quickly—to put that document on a CD or on the web.

Changing ownership

While many factors resulting in the failure of the electronic publishing system

were within the control of the branch being studied, it is clear that the changing ownership of the company played a significant role in the lack of action. Two times during the period studied, the company was purchased by another firm. This affected the development of a website in several ways. For one, the visual identity of the company was in flux, as it decided exactly what the new name of the company and branch would be (the branch was given a new name under one of the purchases). With that as well are the decisions about logos and company colors which needed to be ironed out. Secondly, the change in ownership also led to changes in how the website would be created, who would create the website, what would be on the website and how updates and changes would be made. In addition, with the change in ownership came a restructuring of the company and a restructuring within the branch. Positions were eliminated and people were given new responsibilities. Consequently, one person who may have played a big role in the website development may have been replaced by someone who had not been a part of the earlier development. Finally, the upheaval within the company meant that establishing a new web presence became secondary to other concerns, such as what products were going to be introduced, continued or discontinued. An internet identity, especially in 1995-1996, while a nice public relations item, was not a necessity in a company going through a merger/acquisition.

Priorities other places than documentation

As mentioned above, the company buy-outs made a web presence a secondary concern at best. But, even without a change in ownership, the company would not have likely placed a high priority on documentation and electronic publishing. Quite simply, the company focus had never been on documents, and that lower level of focus only diminished throughout the early 1990s, culminating in the layoff of all document-related personnel. As one would expect for a manufacturing firm, the primary goal of the company was to design and mass produce products which were competitive in features, quality and price—and, with low-end meters, especially price. As explained before, the lowest bid typically won contracts, meaning the cost of producing and distributing the

documentation also had to be low. In essence, the marketplace de-emphasized the value of documentation, which prompted the company to follow suit. As long as the company would be able to "get away" with hiring a part-time technical writer, having engineering/software/marketing personnel write their own documentation, doing low-quality reproductions and not going through the time and expense of electronic publishing, they were going to do just that.

Financial instability

The differing priorities of the company were underscored by the financial crisis the branch was in. While other branches were making a profit, the branch being studied had been losing millions of dollars for several quarters and had been losing market share to its competitors. In the back of the minds of the management, technical elite and workers was the question of whether the branch would survive. Could the branch turn the corner and start to make a profit? How soon? How many more quarters of losses would the international ownership endure before closing the plant down? With the survival of the branch at stake, it is no wonder that documentation and electronic publishing were not at the top of the priority list. Reducing overhead and increasing sales and efficiency were the top goals. Reducing overhead, of course, meant cutting personnel. It is no wonder that in order to cut costs—or, perhaps more importantly, to show the superiors in Europe that efforts were being made to cut costs—positions were cut, and not surprisingly, the areas that were cut were ones which were viewed as non-essential to the core function of the plant: producing meters. Producing documentation, of course, was not viewed as a core function, let alone upgrading the current distribution methods by adding an electronic publishing option. In addition, department budgets were cut and new projects were not funded, meaning requests for the funds to move to electronic publishing would not have been granted.

The financial instability of the branch led the management to take a very short-term approach to its cost cutting (when you're not sure if there will be a "long term," it's difficult to make plans for that long term). So, while the graphics manager might have been

able to show that he was saving the company money by producing documents in-house, he was laid off and the printing press was sold because taking those actions would save money in the short term. Likewise, the company was prepared to produce lower-quality documentation (in terms of either content or printing quality), which may have long-term ramifications (lost customers, errors which could result in lawsuits, the need to replace the documentation with another copy later because of paper or binding quality, etc.) but which would save costs in the short term. Finally, the move to electronic publishing, which was originally suggested as a cost-saving move, was scrapped in part because the start-up costs for such technology implementation outweighed the costs of getting by through making photocopies and producing documentation and product schedules using Microsoft Word and laser or insta-copy printing.

Understaffed

The financial instability had another negative consequence: understaffing. After the wave of cutbacks which were implemented in early 1995, the marketing and engineering ranks were decimated. Those who remained were left to take on not only their own work, but the workload of those who were laid off. The combined workloads were simply too much for the employees; in order to maintain sanity and some semblance of a home life, the workers needed to cut corners, and were not able to do the amount and quality of work which had been undertaken by their former colleagues. They needed to perform triage, quickly skimming through the projects and assessing which ones needed immediate, emergency attention, which ones were important and could be addressed later, and which ones that would receive attention if there was any time remaining. The electronic publishing system, as it turns out, fell into the latter category. So, not only were the people who would/could have begun an electronic publishing system laid, off, but the people who were left did not have the time to take on such a project.

The financial instability and understaffing also led to other problems. The financial instability led one engineer to take a similar job with a rival company. Concerned that he might not survive the next round of layoffs, he felt he needed to make sure to provide for

his family by taking a position with a more stable company. Two marketing people also left the company to take other jobs, afraid that the company might go under at any time. One software specialist took a job at another company in the same town, in part out of concerns about the new workload which was forced upon him after another software person was laid off. To make matters worse, the position of the person who resigned was not filled until some time later because of a further negative consequence—it's hard to get people to fill a position if they know the company might not be around the next week. Consequently, what was a three-person software department ended up with having only one person, and that person did not have time to do hardly any software coding because of additional marketing responsibilities that were thrust upon him. This former software manager was also one of the key people who was responsible for documentation and implementing an electronic publishing system—but, with troubleshooting software problems, spending a lot of time on the phone and trying to learn more about marketing, he did not have the time or resources to implement an electronic publishing system.

Start-up costs/company-branch relationships

As I will outline below, the quickest, cheapest and easiest method for setting up an EP system would have been to have an in-house person create documents and secure ample space and sufficient reliable dial-in access in an account set up by an internet service provider. But, because the current employees were understaffed and did not have the literacy for such an undertaking, they would have needed to have outside contractors do this work. But, as mentioned before, departmental budget cuts made this an impossibility. So, because of a lack of funds and because the branch did not have anyone with the literacy to undertake an EP system, they were forced to let it be undertaken by another branch which did have the resources. This other branch in Illinois led the way and many of the decisions ultimately rested with them. Meetings were held with representatives from other branches, but not coincidentally, the meetings were held at the location of the Illinois branch, which was likely going to be footing most of the bill for the project. The upshot of this is that while there was a big advantage in having a main

website which was going to be coordinated among all of the U.S. branches, the branch being studied was largely at the mercy of the others in terms of content and schedule. The other branches had different priorities, and because of the need for the meetings and the work to be done outside the company, the website in 1997 was neither completed nor did it have all of the content desired by the branch studied. Most notably missing was any documentation or online catalog, the two priorities set out in 1995 when an electronic publishing system was proposed.

What should the company have done?

There were many things the company could have done differently which could have both reduced costs and led to higher quality documentation and documentation more accessible to customers.

Chosen to move to a web publishing system

This option, *if supplemented by paper versions*, was the best choice. The web, even in 1996, was the most logical means for document distribution. The other electronic publishing methods simply had too many drawbacks. Floppy disks, while able to be used by most all of the customers, had space limitations and had reliability problems. A fax-back service, while sufficient for one- or two-page product schedules, would not have worked for documentation. The quality of printouts is sub-par, and printing out a 100-page set of documentation would have been very cartridge-consuming and time-consuming and tied up both the company's and the customer's phone lines. It would have been very costly for the customer. Email also works well for short documents or passages of documentation, but the large file size of some of the documentation would have created problems for many users. In addition, email addresses change often, and keeping a database of email addresses current would have been very difficult. A CD-ROM method is probably the only EP option which could have rivaled a web publishing system. It would have been able to accommodate the catalog and all of the documentation on one disc. And, more and more customers were gaining CD-ROM access. The main problems with this option are updating and cost. Whenever a new set of documentation or a new

part of the catalog was added, the company would need to send out a new CD-ROM. These frequent updates would have been very costly and it would have been difficult for the customer to keep all of the CD versions straight. More importantly, the CD-ROM option would have been more expensive (preparing the master, burning all the CDs, postage and handling costs), and the company was not in a financial position to incur those costs.

Having a web option in addition to paper copies would have had several benefits. For one, it would have reduced the personnel and printing expenses involved in supplying addition documentation for customers. It also would have enhanced the company's image by making it seem more "state of the art" than its competitors, none of whom provided this service. In doing so, it would have also provided a very useful service to customers, who may have chosen to do more business with the company in the future. And, having the documentation on the web would have paved the way to move to not having to supply paper copies a few years down the road.

Established a simple, yet attractive web site for the branch

Especially in 1995-96, customers would not have been expecting fancy web pages, and quite frankly, given the customer base, many would not have wanted the frills, java applets and frames which would increase download times and could cause problems with their particular browser. The branch could have reserved a domain name that made it clear it was not part of the international site, and set up a site with an internet service provider which could have accommodated the likely number of hits encountered (the company could have monitored the site and changed providers if the hit count became too great and the level of service and reliability of access were being compromised). This site could have been used for both promotion and support, and the addition of documentation, a forum and a "frequently asked questions" page for the various products could have reduced support costs and freed up personnel to take on other tasks. Later, the company could have added catalog/ordering options as a means for both providing more customer service and enhancing revenue.

Establishing this site, and not waiting for the other branches, could have been done fairly quickly. And, having already established a site, the branch could have likely had a greater influence on the design and content of a company-wide site which was created later. For example, by having sections for documentation and support already created, the chances would be greater that these sections would be included in the company-wide page. Having a page already established would have also helped when the company changed ownership; the branch could have simply changed some logo, set up new domain name and made the previous address a referring page, providing this site while the various branches and company heads decided what to ultimately do with the new company's web presence. And, since the page was already in place, the parent company may have allowed the branch to keep its page or make a link from the company's main page.

Setting up a basic page with 2-10 MB of storage space would not have been very expensive, perhaps $20-$40 per month. The development time and costs for a basic site with some promotional and support pages would also not have been too great.

Used Adobe Acrobat technology

Using the web or CD, the company had limited options if it chose to distribute word-processed documentation or product schedules:

a) It could include multiple copies of the same documents, using different text (text only, rich text format) and different software applications (MS Word for Mac, MS Word for Windows, Word Perfect, Ami-Pro, etc.) and multiple versions of those applications (Word 4.0, 5.1, 6.0, etc). Naturally, this would take up large amounts of disk space and may create confusion if multiple disks are needed.

b) Only use Rich Text Format. While this would accommodate different word processors, it would prevent the use of more complex formatting and would create problems with graphics

c) Use Microsoft Word for Windows. This would have accommodated the needs of a majority of the users--especially those wanting to use electronic distribution. But, even if all of the customers wanting electronic copies had Microsoft Word, many conflicts with

different versions of Word, different fonts installed and different graphic filters would have resulted in unusable documents, more support time, and a less professional image of the company. In addition, the documentation could be accidentally or deliberately changed when being viewed or before being printed, which could cause serious problems for both the customers and the company.

On top of this problem is that fact that some documentation and most all of the product schedules were done in Pagemaker and would have needed to have been reformatted in Microsoft Word.

One possible solution to these problems would have been to use Adobe Acrobat Portable Document Format (PDF) files. This technology, available as early as 1995, would have allowed the company to produce and distribute files independent of platform and application. Perhaps more importantly, the PDF format permits complex formatting, attractive fonts and color, all features of quality documents which would be a problem using any other system. So, instead of reading a black and white text file, customers could be reading a graphically intense two-color or even full color document. Given the importance of color when handling wires and troubleshooting a complex piece of equipment, such graphics and color could prevent errors (perhaps even errors which would be fatal to the meter or the worker) and prevent support calls to the distributors and factory, saving time--and thus money-- for both the customer and the company. The only obstacle is the need for an Adobe Acrobat Reader, a program needed to view the documents. Copies of this program—the reader was and is a free program--would need to be downloaded from the Internet or sent via CD or floppy to the customers. Naturally, all computers where the documentation or company literature would be viewed would need to have the reader program installed.

The problem of the customer making changes would also be solved by using Adobe Acrobat. First of all, the reader program does not allow the user to make changes to documents, which would preserve the integrity of the company's literature. Even if the customers had the full Adobe Exchange program which enables the user to make changes--it would be highly unlikely that they would have this program, given the nature of the

customer base--the program has a security feature which can prevent users from altering the document without a password.

If the documentation were put on the Web, the security features would become that much more important, since there is an option which would require a password even to open the desired PDF file. In other words, while everyone would be able to download the PDF file from the company web site, only customers with passwords would be able to view that file. In a competitive industry in which companies are constantly monitoring innovations made by their competitors, keeping a manual out of the hands of rival companies is very important. The company was considering taking this approach from the front end in requiring a password to get into certain parts of the site; this approach would allow any visitor to look at the site but keep the documents secure.

Yet another advantage of implementing Acrobat/PDF files is their size. The Acrobat system uses advanced font technology and a system of compression to make files smaller. Quite often the file can be half the size; in other instances it can be as little as one-twentieth the size of the same non-PDF file, depending on the content of the file. Needless to say, when downloading from the Web, when sending files via email or when shipping files via floppy or CD-ROM, having a smaller file size is very advantageous.

The PDF format could also be a boon to the sales force. By putting presentations and other promotional materials in PDF format, the sales force wouldn't have needed to worry nearly as much about problems with memory, font problems, platform problems, application problems or version problems. The use of the PDF format, coupled with CD-ROM burning technology purchased in 1995, could have been a great help to the sales personnel. It would have allowed them to burn CDs of their presentations and company literature and documentation, and having those CDs with PDF files would have helped them copy their presentations and other materials onto the hard drive of potential customer's computers so the customer could view them later. Having the PDF format would have omitted the worries about missing fonts or incompatible programs that often plague word processing and presentation (ex: Powerpoint) files. Having the files burned on to a CD would have also prevented the need for having more peripherals (such as a Zip drive) and kept the integrity of the files so they would be the same for all sales

personnel (no chance of accidental deletion or saving over the files). And, should the sales person's computer ever crash, break down or get stolen, having the key files in Acrobat format on a CD would alleviate many worries and allow for several possible remedies to salvage the presentation (renting another computer, borrowing a customer's computer).

Used Adobe Framemaker for multiple distribution methods

The company could have also used Adobe Framemaker for its production of documents. Framemaker, which uses SGML (the parent language of HTML) would have allowed the company to produce standard 8.5x11-sized paper versions, and with very minimal time the format could be converted to 640x480 or similar screen-sized dimensions for web distribution. Given the expense, the purchase of this program would not have been likely. The steep learning curve involved in using Framemaker and the employees' entrenchment in Word and Pagemaker would have made such a conversion even more unlikely, and perhaps unwise.

Retained the graphic artist for at least another year

If the company did indeed wish to move to electronic publishing, it should have not laid off the graphics manager. Rather, it should have given him the charge of creating an electronic publishing system. With his existing knowledge and additional training he might have received, he would have likely been able to establish at least a rudimentary electronic publishing system. He would have been able to design the site, convert documents and train others in how to convert documents and update and maintain the site. His continued employment with the company could have also involved training personnel in some of the other document publishing technologies (Pagemaker, Photoshop, etc.), making their transition time easier. This would not only have made good economic sense, but it also would have made sense by being in line with Feenberg's critical theory of technology. Yes, the graphic artist, was more a member of the technical elite than an assembly line worker. Nevertheless, continuing his role in the company would have very

likely led to his input on key technology-related decisions, taking away power from the hands of the ownership/management and putting it in the hands of the workers.

Hired a full-time technical writer

The company could have hired a full-time technical writer in place of or better yet, in addition to the graphic artist. Ironically, a similar position did open up at the company within a year after the layoffs, a technical support position designed in part to help answer questions on the phone from customers to free up the engineers and marketing personnel for other tasks—in fact, I was encourage to apply for this full-time, approximately $30-35,000 position, although I turned down the opportunity because it would have compromised this dissertation study and because I wanted to stay in academia. Had the job description had more of a technical writing focus and had the company actively sought a technical writer who had experience with graphics and electronic publishing, they could have had a three-in-one package: someone who could have provided technical support, someone who could have created documents to reduce the need for technical support, and someone who could have prepared documents for the web, which would have further reduced the need for technical support. The company did hire a technical writer from Purdue on a part-time basis, and she did create documentation and other materials, and did a good job, but was not told to focus on electronic publishing solutions.

As with the continuation of the graphic artist position, the addition of a technical elite worker would have helped lead to both a worker and a literate user of the technology playing a vital role in the decision-making process.

Sought input of customers

This dissertation has shown how important the power structure is in technology-related decision making. Perhaps before doing anything else, the company should have sought the input of the rural, municipal and investor-owned utility customers, along with

the company's distributors. In seeking this input and then acting accordingly, the ownership/management would have been relinquishing some of its power, but in involving customers in the decisions, the end result might have been greater customer satisfaction and perhaps an economically sound decision. Seeking such input would have been in line with Feenberg's call for democratizing technology.

Ramifications of layoffs and failure to implement an electronic publishing system

Of course, the company did not do the things above, and thus failed to implement their plan to have an electronic publishing system. This failure, along with the numerous layoffs, had several important negative consequences for the company.

Wasted personnel time

Both the layoffs and the failure to implement an electronic publishing system ended up wasting much personnel time, a problem that was especially acute given the fact that the people who weren't laid off were already burdened picking up the tasks from those who were no longer at the company. The layoffs forced those without any experience and skill in page layout to learn page layout and graphic design. The lack of a full-time technical writer forced many without much writing experience to do that writing. And, the poor planning and failure to implement a email/fax back system which had been devised meant that the company wasted the time of its consultant who created the system, along with the time of the person who supervised him.

Higher costs

Time is money, the cliché goes, and as such, the wasted time translated into wasted dollars. The cost of the consultant mentioned above ran into the thousands of dollars. The cost of the marketing/engineering personnel to do graphic design work, measured at $20-$30 an hour they earned (at least this figure, when factoring benefits, retirement, FICA, etc), was much more. The layoffs also meant the need to hire more

work out to consultants, who often charged well above this hourly rate to do work. The graphic artist estimated that he received as much money in consulting fees as in salary. The lack of an electronic publishing system also led to increased costs in printing, calling, faxing and personnel time in responding to calls for documentation.

In some ways, though, the failure to move to an electronic publishing system may have saved money in other ways. Creating the online documentation may have cost the company hundreds or perhaps thousands of dollars, depending on how the documentation was created. If the files were converted by an expert with the right software (see discussion about Adobe Acrobat), the conversion and server space costs could have been under $1,000, if the number of files weren't too great. The cost of recreating the documentation—either reformatting it in HTML or adding features to help take advantage of the medium and enhance the user's experience with the documentation, would be much more costly.

Lower quality

As mentioned by the laid-off graphics manager and supported with comments from both marketing and engineering personnel, the quality of documents suffered after the layoffs. People without any training in page layout software were creating catalogs and documentation, learning as they went. This lack of experience with the program meant that they weren't aware of the programs' quirks, limitations and advanced features, all of which can have an impact on quality. Even more troubling was the new users' lack of background with page design principles. They had no training in commercial art or graphic design, having come from a primarily engineering background. Just as knowing how to use a word processor does not make one a better writer, so does a page layout program not make one a better page designer. This lack of experience in printing, page design and graphic arts translated into lower quality documents.

Was not implementing an Electronic Publishing system really a failure?

Much of the discussion in this chapter assumes that an EP system would be a good thing, and thus the failure to implement a system was a bad thing. While it is important to ask and answer why the plan to move to EP failed and the ramifications of that failure, it is important to also remember the question raised in Chapter One—would this have been a good move for the customers? This, of course, begs the question about whether indeed the failure to move to EP was really a failure or whether, viewed through the eyes of the customers, whether it was a success. Given that the company originally was considering offering *only* electronic versions of its documentation, the failure might have come in actually implementing such a system. Based on the data from the survey, a majority of the customers would have had a difficult time accessing documentation by email or the web, and many would not have been able to accept CD versions of the documentation. Going ahead with an electronic publishing system could have very well been a disaster. The customers might have rebelled, and the company might have received many phone calls voicing complaint and asking for hard copies of the documentation. (The director of marketing remarked that one company in the industry—not a competitor in the metering business—had supplied materials in CD-ROM format, but had to go back to paper versions). In the end, the company might have had a public relations disaster on its hands, lost business and had to go back to printing paper versions anyway. Both the lost revenue and the increased cost of providing both electronic and paper versions of the documentation would have been very costly to the company. And, such a reaction from customers and possible capitulation by the company would have set future electronic publishing measures back years. Having been burned once, the company would be much more reluctant in the future to even discuss electronic publishing.

IMPLICATIONS FOR TECHNICAL COMMUNICATION PEDAGOGY

The implications of this study on teaching are many. While the site studied may not be typical of most technical writing environments, the findings from the study reinforce the need for several aspects to be included in the technical communication curriculum.

Platform

While many people in graphic arts use Macintosh computers, it is clear that some industries are very Windows-centered; the survey of the electric utility industry is but one example which reinforces other studies about the dominance of the Wintel (Windows OS/Intel processor) machines in the market (Apple now holds approximately 5% market share, down from 8-9% when the survey was conducted). Clearly, students should at least be comfortable operating in a Windows environment. And, while some companies may have a separate Macintosh graphics department, quite often people in these positions must be able to translate graphics files and other files produced on Windows machines. For example, while the graphics manager at the company being studied could have worked on a Mac, he would have needed to be able to translate various graphics files, graphs and text files produced by the engineers, marketing and drafting personnel on PCs, and might have needed to go to their computers to access the files or work with them to save them in a Mac-friendly format.

Selection of media

As late as the 1980s, paper was almost the only media choice for documentation distribution. While paper still is the dominant choice in many industries, the technical writer today has many more media to choose from when creating and distributing documentation. As this dissertation demonstrates, there is a need for people who can work in these various media, and the technical communication curriculum should address this need by having students do projects using various media. Many programs have been changing to accommodate this need by offering courses in multimedia authoring and web

page design. In institutions which do not offer such coursework, the faculty should either investigate the feasibility of offering such courses within the department, look to other departments which may have similar offerings (computer science or commercial art, for example), or look at ways in which instruction about the different media could be incorporated within existing classes (for example, in a documentation class having students create a set of instructions in Pagemaker or Quark and then having the students translate the file into HTML or PDF format for placement on the web or on a CD).

Just as important—perhaps even more so--as the hands-on work in the various media is the instruction in how to select the most appropriate media for the target audience(s). Yes, students need to be able to be proficient in working with programs such as Framemaker, Dreamweaver, Quark/Pagemaker and Adobe Acrobat, but that proficiency is meaningless if the student doesn't know when and how those technologies should be used. Students need to be able to analyze the capabilities and wants of the audience, the capabilities and skills of the company/creator and the costs of distributing the work via the various media and make a recommendation to the boss/client which medium/media would be the most appropriate under the circumstances. Such instruction and experience is critical for the technical communications student in the Twenty-First Century.

One final note about the need for increased instruction in the selection and use of the various media in education. The growth of the web and the increasing demand for multimedia promotional and explanatory material has meant that more and more courses and classroom time has needed to be spent teaching and using the technology. In doing so, sacrifices naturally need to be made. The addition of some courses means other courses often need to be dropped (if the major/emphasis area maintains the same number of hours). The addition of class time in traditional courses on technology means the instructor must cut other material from the courses. Instructors must be careful in weighing the value of what is added versus what is lost. All too often technological skills have been added at the cost of writing skills, which is a very dangerous trade-off, especially considering the technology in the field changes dramatically and quickly.

Non-majors need to take a technical communications course

If there is one thing which this dissertation illustrates, it is the need for engineering, commercial art/graphics and computer science personnel to take a technical communications course. First of all, these non-TC majors need to take the course to be able to better communicate with technical writers in their workplace and understand what they do. But, even more importantly, in an environment in which technical writers are downsized, the brunt of the work will fall upon these subject matter experts. The computer/software designer will need to write documentation for the software and hardware. The engineer will need to write documentation for the product. With this in mind, academic departments in these technical fields need to prepare their students for a workplace in which they may be doing the bulk of the technical writing. In short, they need to either add technical communication instruction (in a separate course or within their courses) within their curriculum or have their students take a TC course outside of the department. The diverse make-up of a technical communications class—such as that found at Purdue, with EET, CIS, commercial art and English majors—had the added benefit of better preparing technical communicators to interact with people with different backgrounds, perspectives and world views.

Preparation for employment as a consultant

While one trend within the company and within the technical writing field is to have the subject matter experts writer their own documentation, the other trend illustrated by this dissertation is the growing use of "outsourcing," of hiring technical writers on a contract or consultant basis. For some technical writers, this outside work may be used to supplement income from a full-time position; for others, consulting may be their only source of income. For the sake of both of these types of people, advanced technical communication courses should include information about the nuts and bolts of doing consulting work on topics such as legal and ethical issues in consulting, ways of finding out about and securing consulting positions and details to include on bids for projects and

requests for proposals. This information could also be given in the context of searching for internships or full-time employment.

IMPLICATIONS FOR TECHNICAL COMMUNICATORS

Many of the implications for technical writing instruction overlap with those for technical writing as a profession. As mentioned in the preceding paragraph, the growth of consultant work needs to be addressed by the professional organizations in the field; that need has become even more clear in the months following the dot-com bust in early 2000. To its credit, the main technical communications organization, the Society for Technical Communication, has published articles on consultant work in its journals. Consultants can also seize on the trend of having subject matter experts write their own documentation; these people could often benefit from a one- or two-day seminar, either on-site or at another location with people from other companies. The best people to conduct these seminars, of course, are experts in technical communication, quite often consultants.

Electronic Publishing

Another obvious implication arising from this study is the need for those in the field to become more proficient with electronic publishing. Clearly, more and more companies are using electronic publishing as an upgrading measure, providing easier and quicker support for products. When customers can't find documentation for a product, they no longer embark on long searches through their workplace or home to find the documentation, and when that fails, call the customer support center to have documentation sent to them and receiving that documentation days later. Now, they do a quick search at the company's website or on a search engine like google.com, perhaps finding the documentation within seconds. This availability not only makes the customer happy, but saves the company in printing costs, mailing costs and customer service costs. As a result, companies also see the online documentation as a cost-saving measure, especially if the documentation can be quickly and easily converted from paper to online form, as is the case with PDF files. But, technical communicators need to also know how

to more than just convert documentation from paper to online. Instead, they need to examine how the new medium can enhance the user's experience with the product and the documentation. Online help files are one such method. The addition of full-color—costly in print but free in online form—is yet another way that the online version can be superior to the print version. Color-coded warnings and headings, in addition to full-color graphics and photos, can help the user understand both the product and the documentation better. Likewise, supplementary graphics and text files—again, sometimes costly in print form to add—can also benefit the user. Hypertext links which go to related products, definitions of key terms, more graphics or other pages/sites can also be added very easily. Looking truly "big picture" and at how broadband technologies and faster dial-up access has transformed the web, technical communicators need to think more and more about multimedia. Perhaps most importantly, the documentation can be updated online as errors are found and updates and upgrades are made. While documentation was once considered "dead" once it was printed and the product was shipped, it should now be viewed as more of an ongoing process.

Show value as a technical communicator

So much of what is taught in technical communication is based upon the assumption that the students and their audiences for their projects understand the need for good documentation and good technical communicators. But, as this study clearly shows, not everyone shares that assumption. As I outlined in the literature review in Chapter One, Barchilon and Redish note how technical communicators need to show how they add value or save money for the company; this study provides a real, concrete anecdote to illustrate that need. Many companies go through downsizing periods because of downturns in the economy or industry segment or because of financial hardships within the specific company. As with the company studied, many companies look short term when making decisions about who to lay off. They also look at departments which do not actually produce revenue or which do not contribute to the design or production of a product. In addition, these companies look for areas which could have work "farmed

out." The work of technical communicators, of course, does not always influence the design or production of a product (although the recent trend has been to involve technical communicators earlier on in the design phase, to serve as "user advocates"), and therefore management often sees technical communicators as expendable. In addition, the work of technical communicators can sometimes be outsourced, and their work seldom produces revenue per se. Combine these disadvantages with the executives' lack of understanding about the role, duties and capabilities of technical communicators, and it is easy to see why technical communicators are sometimes the first people on the chopping block.

This also has implications for Technical Communication pedagogy. Students aren't often taught this fact in their technical writing courses. They should be taught this, and their advanced technical writing courses should address how they can both prevent their jobs from being downsized and how to cope if they are downsized.

On the prevention side, students should be taught how to gather and evaluate data to show their worth to the company. It is difficult to measure revenue gained as a result of quality documentation. Documentation is released with the product, and it is hard to measure whether quality of the product/update resulted in the sale, whether the documentation helped earn the sale or whether the user's positive experience with the product)perhaps partially a result of quality documentation) led to referrals or to the user purchasing more of the same product or other or future products/updates from the company). But, questions can be placed on product registration cards which address the quality of the documentation and its affect on user satisfaction and likelihood of purchasing future products or making referrals. Likewise, focus groups or user testing groups with the documentation and the product can be queried about the effectiveness of documentation, promotion materials or other items produced by technical communicators.

What can be measured a bit more easily is the amount of money saved by good documentation. The technical writer should encourage the company to keep a log of all technical support calls and use this log to gauge the quality of the documentation and the cost of technical support. By having a log which indicates the problem(s) the user had, the length of the call and the success in solving the problem, the publications/documentation head can gauge the approximate cost of support and use this

data to compare with previous and future versions of the product and documentation. This data can also be very helpful to the company in determining changes which need to be made to the documentation and/or the product to make it more user-friendly.

Importance of Technical Communicator to be a User Advocate and involved in more than just creating documentation

Finally, the study shows how technical communicators need to do much more than just write documentation in a cubicle. They need to take a pro-active stance in serving as the voice for users throughout the creation of a product and its technical support systems. They need to be play an active role in the design of products from their very beginning, looking at how changes in the design can enhance the user experience. Technical Communicators also need to look at the methods of document distribution to see that the customer needs are being met through the various media, as mentioned in the implications for pedagogy section. And, as will be discussed in the next section, technical communicators can use their power in serving the user in order to help democratize the user of technology.

IMPLICATIONS FOR THEORY

In many ways, this dissertation reinforces Feenberg's critical theory of technology and builds upon his refinements to that theory in Alternative Modernity. Written four years after Critical Theory, Alternative Modernity focuses on specific instances of how democratizing technology can take place, as in the case of AIDS patients and the French Minotel. In doing so, he shows that the critical theory can operate at both a micro and a macro level, and this dissertation shows how a critical theory could/should have been espoused at the microlevel of this particular culture. Perhaps more importantly, Alternative Modernity extends the definition of "worker" to include "user." In his earlier work, Feenberg retains the Marxian focus on the lower level worker and notes how that lower level worker needs to be involved in a dialectic which determines the uses of technology, thereby democratizing technology. In the later work, however, the examples

of the AIDS patients and Minotel users who wielded power to effect change illustrate how the end user or consumer can play a role in democratizing technology. My dissertation serves as yet another demonstration of how the end users--customers--can play a role in the decision-making process and what the ramifications are if they are not given a voice.

But, in many ways, there is also a gap in Feenberg's body of work. While he does briefly mention the role of the technical elite in his books, he does not focus on them or their power very much. As shown in the history of document production at the company studied and the analysis of the various data, the technical elite play perhaps the most pivotal role in the power structure. Because they are within the company and in decision-making positions, they have a much easier ability to quickly bring about a change in the company's use of technology. And, because technology has grown more complex and ownership/management is often too wrapped up in other issues, the ownership/management group is often content to trust in the recommendations made by the technical elite. Likewise, this dissertation shows the importance of the technical elite by showing what happens when the technical elite are not present. Without the technical elite, quite often technology is not implement at all, and if it is, it is implemented by the ownership/management without input from the customers/users. This relates very well to technical communicators, because technical communicators quite often are the technical elite. And, perhaps more than any other group within a company, they keep the user experience with the technology in the forefront of their minds. As such, this dissertation shows how our field needs to embrace Feenberg's work and a new emphasis on the power of the technical elite/technical communicator--and the ethical responsibility accompanying that power.

The dissertation also validates the importance of literacy and serves to extend, like others have done, the concept of literacy into the workplace. While the move to the workplace complicates traditional notions of literacy, it is clear that the levels of "access," "reading" and "writing/creating" with the technology indeed do apply to the workplace and to the field of technical communication--in terms of both the technical communicator and the user--and need to be explored more fully.

SUGGESTIONS FOR FUTURE RESEARCH

Because of the limited generalizability of this study's findings and because of the huge growth in electronic publishing in the last decade, more research in this area needs to be conducted. One possible research path might be to focus on several companies within the same industry which have moved to electronic publishing. Such research would reveal interesting similarities and differences in the approaches, visual images and content of their electronic publishing systems. Because these companies would have almost the same customer base, there would be few differences in capabilities, backgrounds, experience and preferences, which would in turn enable the research to discover the reasons behind the similarities and differences.

Another research study might look at another company or companies which downsized their document production and distribution personnel and how they coped with the loss. Who wrote the documents after the layoffs? What was their experience level with technical communication? What was thir experience level with the creation and distribuion technology? Did the content or layout suffer? Were fewer documents produced? This study might concentrate on the technical communicator(s), but as this dissertation has shown, the graphics personnel are also sometimes downsized, and their plight and the ensuing plight of the company after their dismissal often parallel the loss of the technical communicator. The loss of in-house presses could also make an interesting study.

Finally, it might be interesting to conduct a similar study on the same company a few years from now, seeing the progress of an electronic publishing system and the progress of document production and distribution at the company when the financial climate had changed. Such a study could focus on the changes over time in who produced the documentation, how it was produced and how it was delivered to customers. A survey of customers could also be revisited, gauging the increase in computer capabilities and a change in preferences for receiving documentation. I would hypothesize that internet access is now prevalent enough to make a WWW distribution system feasible and

cost efficient, but would venture to say that a significant percentage of customers would still prefer to work with a hard copy sent by the company.

BIBLIOGRAPHY

BIBLIOGRAPHY

ABB Corporation. WWW site. http://www.abb.com

Baker, J.H. (1992). A conceptual design for simplifying and structuring electronic documents: An application in professional conduct standards. Dissertation Abstracts International, AAC9315974.

Barchilon, M. (1993). Introduction. Technical Communication. 16-19.

Beam, Jerome C. and Pines, Howard M. (1992). Working with survivors of downsizings. HR Focus 69. 1-3.

Beason, Gary. (1996). Redefining written products with WWW documentation: A study of the technical writing process at a computer company. Technical Communication. 43:4. 339-348.

Blyler, Nancy Roundy and Charlotte Thralls, Charlotte. Making a collaboration work. The Bulletin of the Association for Business Communication, 51: no. 1, 50-52

Bosley, Deborah S. and Morgan, Meg. Our experience as collaborative ethnographers. The Bulletin of the Association for Business Communication, 51 no. 1, 53-55.

Carlson, Patricia A. (1988). Hypertext: A way of incorporating user feedback into online documentation. in Text, ConText, HyperText: Writing with and for the computer. ed Edward Barrett. 93-110.

Colin Maunder. (1994). Documentation on tap. IEEE Spectrum. 52-56

Couture, Barbara, Rymer-Goldstein, Jone, Malone, Elizabeth, Nelson, Barbara, and Quiroz, Sharon (1985). Building a professional writing program through a university-industry collaborative. Writing in nonacademic settings, ed Lee Odell and Dixie Goswami. 391-426.

Cover, Martha; Cooke, David; and Hunt, Matt. (1995). Estimating the cost of high-quality documentation. Technical Communication. 42: 1. 76-83.

Cross, Geoffrey A. (1993) The Interrelation of Genre, context , and process in the collaborative writing of two corporate documents. Writing in the workplace: new research perspectives. ed. Rachel Spilka.

Cross, Geoffrey A. (1990) A Bahktinian explanation of factors affecting the collaborative writing of an executive letter of an annual report. Research in the Teaching of English. vol 24, no. 2. 173-203.

Cross, Phillip S. Utility downsizings pose a dilemma for regulators. Public Utitlities Fortnightly 131. 43-5.

Dautermann, Jennie and Sullivan, Patricia. (1996). Introduction: Issues of written literacy and electronic literacy in workplace settings. in Electronic literacies in the Workplace: Technologies of Writing. ed. Patricia Sullivan and Jennie Dautermann. vii-xxxiii.

Dautermann, Jennie. (1996). Writing with electronic tools in Midwestern businesses. in Electronic literacies in the Workplace: Technologies of Writing. ed. Patricia Sullivan and Jennie Dautermann. vii-xxxiii.

December, John. (1996). An information development methodology for the World Wide Web. Technical Communication 43:4. 357-368.

Edmonston, Jack. (1994). Experience can't be measured in dollars. Business Marketing 78. 34.

Farkas, David K. and Poltrock, Steven E. (1995). Online editing, mark-up models and the workplace lives of editors and writers. IEEE Transactions on Professional Communication, 38. 110-18.

Featheringham, T.R. (1981, October 13). Paperless publishing and potential institutional change. Journal of Scholarly Publishing, 1. 19-30.

Feenberg, Andrew (1995). Alternative modernity:the technical turn in philosophy and social theory. Berkeley: University of California Press.

Feenberg, Andrew and Alastair Hannay (eds.) (1995). Technology and the politics of knowledge. Bloomington: Indiana University Press, 1995.

Feenberg, Andrew. (1991). Critical theory of technology. New York: Oxford Univeristy Press.

Filipowski, Diane. (1996).The right way to downsize. Personnel Journal 72. 71.

Fletcher, N. (1996, April 22). Interview.

Freeman, Sarah J. (1994). Organizational downsiging as convergence or reorientation: implications for human resource management. Human Resource Management 33. 213-238.

General Electric. WWW site. http://www.ge.com

Gibbs, Dan. (1995, Summer). Informal Conversations.

Gray, Matthew. (1996). Web growth summary. Cambridge, MA. MIT. http://www.mit.edu:8001/people/mkgray/net/web-growth-summary.html

Greengard, Samuel. (1993). Don't rush downsizing: plan, plan, plan. Personnel Journal 72. 64-71.

Haas, C. & Neuwirth, C.M. (1994). Writing the technology that writes us: Research on literacy and the shape of technology. in Literacy and Computers: The Complications of Teaching and Learning with Technology , ed Cynthia Selfe and Susan Hilligoss. 319-335.

Hall, Wendy and Carr, Leslie. (1995). Electronic Publishing on the Internet. Computer Bulletin 7 17-19.

Hammersley, M. & Atkinson, P. (1995). Ethnography: Principles in practice (2nd ed.). New York: Routledge.

Hancook, Steve. (1995, February 23). Meeting with Tom Martin.

Hanus, E. (1995). A paradigm for electronic publishing in the humanities and social sciences. Dissertation Abstracts International, AA1274790.

Haselkorn, M.P. (1989). From online documentation to intuitive interfaces: Technical communicators join the design team. Journal of Technical Writing and Communication, 19. 357-70.

Haselkorn, M.P. (1988). The future of writing for the computer industry. in Text, ConText, HyperText: Writing with and for the computer. ed Edward Barrett. 3-14.

Horton, William. (1993). Let's do away with manuals . . . Before they do away with us. Technical Communication. 40:1, 26-34.

Howard, Tharon. (1993). Electronic distribution of hypermedia on wide-area networks: An update. Technical Communication 40:3, 438-448.

Hunt, Kevin. (1996). Establishing a presence on the World Wide Web: A rhetorical approach. Technical Communication 43:4. 357-368.

James, Geoffrey. (1988). Artificial intelligence and automated publishing systems. in Text, ConText, HyperText: Writing with and for the computer. ed Edward Barrett. 15-24.

Johnson-Eilola, Johndan and Selber, Stuart A. (1996). After automation: Hypertext and corporate structures. in Electronic literacies in the Workplace: Technologies of Writing. ed. Patricia Sullivan and Jennie Dautermann. vii- xxxiii.

Karner, M. (1996, April 18). Interview.

Keyes, Elizabeth, Sykes, David, and Lewis, Elaine. (1988). Technology + design + research = information design. in Text, ConText, HyperText: Writing with and for the computer. ed Edward Barrett. 251-264.

Kirsch, John. (1988). Investment in computer-product documentation: Causes and effects. in Text, ConText, HyperText: Writing with and for the computer. ed Edward Barrett. 187-210.

Lai, Y. (1994). From information searching to learning: A comparison of contrastive hypertextual menu designs for computer-based instructional documents. Dissertation Abstracts International, AA9503247.

Landis & Gyr. WWW site. http://www.landisgyr.com.

Landis & Gyr. Buffalo Grove WWW site. http://206.126.230.7/landis/

Lauer, J. M. & Asher, W.J. (1988). Composition research: Empirical designs. New York: Oxford University Press.

Lee, J. (1996, April 27). Landis & Gyr lays off 44, cites product change. Journal and Courier . p. A11.

Lindeborg, Richard A. (1993). The irresistible electronic message of the 1990s: A Case Study. IEEE Transactions on Professional Communication. 36: 3. 151-157.

Lycos, Inc. (1996). Home page. Pittsburg, PA. Lycos Inc. http://www.lycos.com

Markels, Alex and Murray, Matt. (1996, May 14). Axing for trouble: Call it dumbsizing: why some companies regret cost cutting. Wall Street Journal 77. 1.

Martin, T. (1996, April 30). Interview

Martin, T. (1996, March 17). Interview.

Martin, T. (1995, February 23). Meeting with Steve Hancook.

Martin, T. (1996, March 17). Interview.

Miles, M. B. & Huberman, A.M. (1994). Qualitative data analysis (2nd ed.). Thousand Oaks, CA: Sage.

Miller, Cyndee. (1993). In their efforts to cut costs, companies also cut service. Marketing News 27. 9-10

Miller, Glenn. (1996 May 2). Interview.

Mone, Mark. A. (1994) Relationships between self-concepts, aspirations, emotional responses and intent to leave a downsizing organization. Human Resource Management 33. 281-98.

Moravec, Milan. (1994). Mistakes to avoid during downsizing. HR Focus 71. 7.

Niven, Daniel. (1993). When times get tough, what happens to TQM? Harvard Business Review 71. 20-31

Okerson, A. (1992, April 23). Publishing through the network: The 1990s debutante. Journal of Scholarly Publishing, 2. 79-88.

O'Malley, P. G. (1993). Information delivery systems: The future is here. Technical Communication. 619-629.

Paradis, James, Dobrin, David, and Miller, Richard. (1985). Writing at Exxon ITD: notes on the writing environment of an R&D organization, Writing in nonacademic settings, ed Lee Odell and Dixie Goswami. 391-426.

Porter, James. (1994). Electronic writing. Encyclopedia of English studies and language arts, Ed Alan. C. Purves. Vol. 1, 420-24.

Powell, Anna S. (1994) Are TQM and downsizing incompatible? Across the Board 31. 48.

Redish, Janice and Ramey, Judith. (1993). Measuring the value added by technical communicators. IEEE Transactions on Professional Communication. 36: 3. 158-161.

Rich, Jude. (1993). Downsizing costs, not people, through needs-matching. Public Utitlities Fortnightly 131. 30-34.

Rymer, Jone (1994). The context for collaborative relationships. The Bulletin of the Association for Business Communication, 51: no. 1, 48-50.

Schlumberger. WWW site. http://www.slb.com

Scott, Michon. (1996). Technical communicators as managers in the informated workplace. Technical Communicaiton 43: 1. 83-87.

Selber, S. (1994). Beyond skill building: Challenges facing technical communication teachers in the computer age. Technical Communication Quarterly, 3. 365-90.

Selfe, Cynthia. (1999) Technology and literacy in the twenty-first century: The perils of not paying attention. Carbonale, IL: Southern Illinois University Press.

Shirk, H. N. (1988). Technical writing's roots in computer science: The evolution from technician to technical writer. Journal of Technical Writing and Communication, 18. 305-23.

Silker, Christine M. and Gurak, Laura J. (1996) Technical communication in cyberspace: Report of a qualitative study. Technical Communication 43:4. 357-368.

Smart, Graham (1998). Mapping conceptual worlds: using interpretive ethnography to explore knowledge-making in a professional community. The Journal of Business Communication 35 111- 127.

Smart, Graham. (1993). Genre as community invention: a central bank's response to its executives' expectations as readers." Writing in the workplace: new research perspectives. ed. Rachel Spilka.

Smudde, P.M. (1993). Downsizing technical communication staff: The risk to corporate success. Technical Communication. 35-41.

Spencer, W. J. (1987). The paperless office. IEEE Spectrum, 27. 125.

Standera, O.L. (1985, July 16). Eletronic publishing: Some notes on reader response and Costs. Journal of Scholarly Publishing, 4. 291-305.

Stetler, R. (1996, April 30). Interview.

Stetler, R. (1996, April 2). Interview.

Stetler, R. (1996, March 17). Interview.

Stetler, R. (1996, February 22). Interview.

Steve, M. & Bigelow, T. (1993). Coping with downsizing as a writing and editing group. Technical Communication. 20-25.

Sullivan, Patricia. (1992). Computer-aided publishing: focusing on documents. Computers & Composition 10, 135-49.

Sullivan, Patricia, & Porter, James E. (1997). Opening spaces: Writing technologies and critical research practices. Greenwich, CN: Ablex.

Sullivan, Patricia. (1988). Writers as total desktop publishers:Developing a conceptual approach to training. in Text, ConText, HyperText: Writing with and for the computer. ed Edward Barrett. 265-278.

Teague, John H. (1995). Marketing on the World Wide Web. Technical Communication 42: 2. 236-242.

Treadwell, D.F. (1988). Commentary: A new role for technical communication. Journal of Technical Writing and Communication, 18. 262-67.

Tynan, Daniel. (1993). "Paperless tigers." Publish, March: 49-52.

Unthinking Shrinking. (1995). The Economist 336 70.

Van Maanen, J. (1988). Tales of the field: On writing ethnography. Chicago: University of Chicago Press.

Wiering, Douglas R.; MacCallum, Marvin C.; Morgan, Jennifer; Yasutake, Joseph Y.; Isoda, Hachiro; and Schumacher, Robert M. Jr. (1996) Automating the writing process: Two case studies. in Electronic literacies in the Workplace: Technologies of Writing. ed. Patricia Sullivan and Jennie Dautermann. vii- xxxiii.

Wilson, Sabrina. (1996, April 22). Interview.

Yin, R. K. (1994). Case study research: Design and methods (2nd. ed.). Thousand Oaks, CA: Sage.

Zimmerman, Muriel (1988). Are writers obsolete in the computer industry? in Text, ConText, HyperText: Writing with and for the computer. ed Edward Barrett. 279-290.

Zuboff, Shoshanna. (1988). In the age of the smart machine: The future of work and power. New York: Basic Books.

VITA

VITA

Robert Bergland was born May 1, 1968 in Mendota, Illinois. He graduated from Millikin University in Decatur, Illinois in 1990. He received his master's degree in Rhetoric and Composition from Purdue in 1992 and pursued his doctor of philosophy at Purdue from 1992-1997. Since fall of 1997, while completing work on his dissertation, he has been an assistant professor at Missouri Western State College, where he teaches technical communication, journalism and composition. He has published articles in Business Communication Quarterly and College Media Review and has co-authored a multimedia CD-ROM simulation for a leading journalism textbook.