CASE STUDY OF TECHNOLOGICAL CHANGE PROCESS

IN SOFTWARE UPGRADES MANAGEMENT

Migrating from Windows-based to Web-based Application

by

Andrea Hassanbasry

A Research Paper

Submitted in Partial Fulfillment of the
Requirements for the
Master of Science Degree
With a Major in

Management Technology

Approved for 3 Semester Credits
INMGT-735

_____
Research Advisor

The Graduate School
University of Wisconsin-Stout
May 2001

The Graduate School
University of Wisconsin-Stout
Menomonie, WI 54751

ABSTRACT

Hassanbasry	**Andrea**	**-**
(Writer) (Last Name)	(First)	(Initial)

Case Study of Technological Change Process in Software Upgrades Management:

(Title)

Migrating from Windows-based to Web-based Application

Management Technology	**Dr. Sheryl Johnson**	**May 2001**	**40**
(Graduate Major)	(Research Advisor)	(Month/Year)	(No. of Pages)

APA

(Name of Style Manual Used in this Study)

Software upgrades is one type of technological change that happens very common in a workplace. Organizations often overlook the importance of effectively managing it, which could lead to employees' resistance to change thus decrease in productivity.

The purpose of this study was to discover how an organization and its software's users cope with a technological change in software upgrades. Four research questions were used as guidelines to build this study. These questions helped the researcher to better understand the migration process and its problems from the users' and the management's point of view.

The research method used for this study was a case study approach. Three data collection techniques for interpretive research used in this study were document analysis, participant-observation, and interview. Information was analyzed using data triangulation method to disclosed findings and results of the research.

XYZ Inc. was the participating company for this study. It was going through a technological change in software upgrades, whereas one of the software it used changed from a windows-based to a web-based application.

The researcher interviewed five participants who represented the users of the software and the management.

The results of the study showed the users' dissatisfaction of the web client's performance and usability, the differences of opinion between users and management on the timing to roll out the web client within their organization, and identified the underlying problems for the management in rolling out the web client.

In conclusion, the research offered some suggestions to the management, software users, and the software vendor to help XYZ Inc. effectively managing the migration. Furthermore, it offered suggestion for further study in the similar field.

ACKNOWLEDGEMENT

This paper is dedicated to my parents, Hassan and Corry, for their enormous love and encouragement, and most of all for believing in me that I can finish my research paper after procrastinating for almost two years. No words can express my gratitude to them.

I am very grateful to Dr. Sheryl "Sherri" Johnson for being my advisor. Her passion in her teachings has inspired me in choosing my research topic.

I want to thank my baby sister, Vanessa, and my best friend, Yuli "Artha" Pangaribuan, for always being there for me.

I also want to express my deepest gratitude to Hermansjah for his help, support, ideas, and encouragement. I am forever grateful!

To all the participants of this research who have provided me with their invaluable information, without which I could never build my research, thank you all!

Lastly, I want to thank my friends for their help and support: David Avianto, Lipitka Wijaya, Arifin Ruslim, Jeff Lin, and Jay Gutierrez.

Special thanks to my cat, Chelsea, for her loyal companionship during the days I wrote this paper. Her curiosity and playfulness always cure my stress ☺.

Andrea Hassanbasry

TABLE OF CONTENT

CHAPTER I

INTRODUCTION

1.1.   Research Background

People perceive change differently; some embrace it while others try their best to avoid it. However, change is unavoidable and it happens in every aspect of human life. Humans spend more than half of their lives working, thus any changes in the workplace would have significant impacts on them.

Change happens continuously in the workplace, whether it is an organizational change or technological change. One type of technological change is software upgrades.

XYZ Inc. is one of the world leading companies, which relies heavily on information technology (IT) to support its operation. For instance, computer software is used as a tool in decision-making process, to plan and execute production throughout its factories around the world.

One of the software is Demand Forecaster (DF), a tool to forecast customer's demand, and is used within the IT Forecasting Group (ITFG) department.

DF is released twice a year by its software vendor, with interim releases for patches to the software between the two major releases. Every release comes with new features and new functionality. Some of the features and functionality may not have significant differences from the previous releases, but some may. The software vendor adds new features and functionality into DF to enhance its performance and also to satisfy its customer enhancement requests.

It means that DF users will face constant changes of the software. The most recent change in DF was the migration of some external utilities to maintain DF

database to Graphical User Interface (GUI) format. Interestingly, not all DF database administrators were using the GUI format since its release a year ago, even though it was easier to use.

The upcoming face of DF would be a web-based application. Currently, DF is a windows-based software written in C^{++} language. The next release containing productive release of web-based DF is scheduled for launching in May 2001 by the software vendor and the last shipment of the windows client is in October 2001. All requests for enhancements of DF by its users are directed toward the web client only. It means that the software vendor has fixed plan to release and support the web client and discontinue releasing and supporting the windows client at some time in the near future.

Migrating from windows-based to web-based client would have great impact to DF users and the ITFG department. The web-based client has a total different look from the windows-based. Even though in the web-based DF most of the functionality from the windows-based client are retained, but users need to be introduced to and educated to be accustomed in utilizing the web client.

Presently, the management struggles to have all DF users migrating from one release to the most current one to keep up with the pace of DF vendor in launching new releases. At the time this paper is written, XYZ Inc. was two releases behind. The management finally had to set up a date where every business unit would use the DF version that was released in May 2000.

The reason why the management had to do this was because of the DF vendor's two-versions-back support policy. For instance, if the current release was 3.0 version, than the software vendor supports 3.0 and 2.0 versions only. So, if any problems of the software occur and the software used did not fall into the support range, the vendor would ask its client to migrate to the current release, since usually the newer release has more enhancements and bug fixes added to it. Insisting not to move forward with

current releases is too great of a risk to take and could jeopardize the continuity of production.

The management would face bigger challenge when it is time to have every DF users to move to the web-based application. Since the technology used to run web-based application is different than the existing windows technology, there would be some preparation that ITFG management had to do before rolling out the web-based DF. Besides the new technology issue, there would be needs for training and educating DF users.

Management cannot do this with "iron hands", forcing the migration upon DF users. On the other hand, DF users have to be prepared for the change, so they will be less reluctant to move forward and see the advantages of utilizing the new web-based application.

Given all the above, this research focused on how DF users perceived the change and their expectations from the management in accommodating them with a smooth migration. In addition, the research was conducted to disclose ITFG management's efforts in preparing DF users for the migration.

1.2.   Research Questions

There were four research questions that need to be answered by conducting this study. First, how DF users at ITFG perceived the change and prepared themselves for the migration. Second, what they expected from the management to aid them coping with the change.

In conjunction with the above questions, the researcher also wanted to understand the migrations process from the management's perspective. So the third question was what the management has done in preparation for the migration. Lastly, what obstacles the ITFG management had to face in rolling out the web client.

Answering these questions would eventually bridge any expectations and communication gap existed between the management and DF users during the migration process.

1.3. Justification for Research

As we entered the Information Era where more and more companies are becoming dependent on information technology and its advances, technological change in the workplace is becoming a more common issue that every management has to deal with.

The increasing interest in the application of qualitative research methods to study organizational issues in the information systems [information technology] (Myers, 1997) has driven this study to investigate technological change at XYZ using qualitative research approach. Moreover, the lack of research conducted in software upgrades management has strengthened the purpose to conduct this study. Last but not least, the fact that the web technology is fairly a new technology used as a software platform has made this study more significant to conduct to help other companies that deal with similar migration issues as XYZ Inc. does.

1.4. Assumptions

This research was limited to the investigation of the technological change in software upgrades management of DF software within the ITFG department.

Participants for this research were limited to implementers and administrators of DF, not the end users of the software, because at the time of study the end users had not had hands-on experience with the web-based client yet. A Quality Assurance (QA) analyst/product support person was chosen as a participant to represent the ITFG

management because of his function and role in the migration process: being the liaison

for DF users and ITFG management and also for DF users and the software vendor.

Pseudonym names were used in this report to protect the confidentiality of the

participants.

1.5.   Definitions

The terms software platform and infrastructure are mentioned in this report.

Clarification of those terms would help the readers to better understand this study.

A software platform is a software package that enables the realization
of application systems. Examples of software platforms are operating
systems, database systems, CASE environments, workflow/workgroup
systems and general-purpose, customizable application packages such
as SAP R/3 or ORACLE. Together with the hardware and the
organizational knowledge about planning, designing and operating
application systems, the software platforms in use constitute a firm's
information technology infrastructure. (Taudes, 2000, p.227)

1.6.   Methodology of Research

This research was conducted using case study approach. Information was

gathered using three various methods, which are participant-observation, interviews and

document analysis. Research participants were individuals who were directly affected

by the change or had roles in incorporating the web-based DF to ITFG department.

They were selected so both the users and the management were represented in this

study.

1.7.   Report Outline

This report was written in accordance with the American Psychological Association (APA) style and consists of five chapters as follows:

Chapter 1: Introduction

Laid out in this chapter are background and reasons for conducting research, statement of the research question, justification of research, assumption and limitation of the research to maintain that the research process is in tact, method used in conducting the research and lastly, outline of the report.

Chapter 2: Literature Review

This chapter contains information related to this research, which was gathered, from scientific books and journals as a theoretical foundation in conducting research.

Chapter 3: Methodology

The qualitative research method selected and the detailed research procedures were discussed in this chapter so others can replicate it.

Chapter 4: Results

After all the information needed was gathered completely, findings and results of research were discussed in this chapter.

Chapter 5: Conclusion:

Chapter five finalizes the research by providing recommendations for ITFG management, DF users and the software vendor. Recommendations were also made for further and ongoing research in the similar field of study.

CHAPTER II

LITERATURE REVIEW

2.1. Introduction

There are not many studies that have been conducted in investigating technological change in software upgrades and its impact to organizations. There are few, if any, books to help an information technology (IT) manager deal with the organizational issues associated with technological change. (Shaw, 2001) The researcher opted for broader literatures that discuss technological change management in the workplace to build theoretical foundation for this study. This condition therefore strengthens the case for the researcher to conduct an investigation on software upgrades management.

Organizations are required to deal with different types of environments that constantly changing. The more rapid environments change, the more dynamic and flexible organizations expected to be. One of the main causes of environmental change is the rapid development, dissemination and adoption of new technology. (Krell, 2000)

Software upgrades is only one type of technological change but is the most common change that happens in modern organizations because the rapid pace with which software vendors release new versions. (Shaw, 2001)

2.2. The Future of Technology in Software Upgrades

The Internet technology enables software to run over the Internet connection. The user never needs to install it on his/her PC, which means that the application can be stored on the server and maintained and upgraded centrally. (Kanter, 2000)

An article by Stanley Zarowin, *Technology for the New Millennium*, supports Kanter's opinion. Zarowin argued that the Internet technology enables software being transmitted over an Internet connection, or other new technologies that eventually replace the Internet, from the vendor's own server to a user's PC. And as a result of that, people will not have to upgrade an application ever again, since the software is leased from the application service provider (ASP) and will be upgraded in the vendor's own server computer. (Zarowin, 2000)

This is the direction that the software vendor of Demand Forecaster (DF) is pursuing with its web-based DF.

2.3. The New Approach in Software Development

In this research, the vendor of DF released the beta version, the early stage of software, to XYZ Inc. in hope that DF users at XYZ could provide them with feedback to enhance the software. This is a new approach in software development that is performed in iterative manner, which contrasts with traditional models of software development and their more sequential process. (MacCormack, 2001)

According to MacCormack, the new iterative model of software development started when the software companies first release a low-functionality version of a product to selected customers at very early stage of development. The next step would proceed iteratively, where the design process of the software is allowed to evolve in response to the customers' feedback. (MacCormack, 2001)

He also found that if customers are involved in testing products that are early in development and have low functionality, the final products of the software are likely to have higher quality. (MacCormack, 2001)

2.4.   Ease of Use

Jerry Kanter in his writing stated that it seems that as computers and software grow more powerful, they are also growing too complex for most IT customers to use. Through his article he wants to stress the human element of the complex systems and focus on satisfying ever-increasing number and variety of users of current and future systems. His article is a reminder that using IT should help people accomplish tasks and not be a task itself (Kanter, 2000)

2.5.   The Human Side of Technological Change

Besides the technical factor that an organization has to deal with technological change, there is the human factor that plays an equally important role that can cause resistance to change for the organization's proposed plan for a change. "People do not resist change per se, rather they resist the uncertainties and potential outcomes that change can cause." (Waddell and Sohal, 1998, p.545)

Change causes grief to users; it is the way that humans react to change that is out of their control. (Melymuka, 2000) This article explains that the grief that users feel is caused by the loss of the old system that is being replaced with a new one. Melymuka argues that managers should acknowledge and respect the grief.

In the study of investigating how technology users behave during the loss of a system, Johnson found five classic stages of grief: denial, anger, bargaining (i.e. suggesting that the new system is run in tandem with the old), depression (i.e. focusing on loss of prior expertise, power of status), and acceptance. On the last stage, acceptance, users are recognizing that the new system will result in new skills and knowledge, refocusing on positive activities such as training, and acting as an advocate for the new system. (Melymuka, 2000)

Sandy Kristin Piderit wrote that employee's opposition to a proposed organizational change cannot be judged as simply resistance to change but there should be reasons behind it, for instance ethical principles, resistance that is motivated more than mere selfishness, or employees might try to get top management to pay attention to issues that employees believe must be addressed in order for the organization to maintain high performance. (Piderit, 2000)

She also argues that a successful organizational adaptation to change is increasingly dependent on generating employee support and enthusiasm for proposed changes, rather than just overcoming resistance itself. (Piderit, 2000)

Management can benefit from employees' resistance to change by carefully managing it by looking for ways of utilizing it rather than overcoming it. (Waddell and Sohal, 1998) Resistance can be used as an indicator for areas of low morale, motivation and poor communication. (Farrow, 1997)

2.6.   Effectively Managing Technological Change

In the software upgrades management, as vendors release new software products, customers are faced with the prospect of upgrading to the new software. If not managed properly, the upgrade might cost significant amounts of money and/or decrease employee productivity. (Shaw, 2001)

To effectively managing technological change within an organization, the technical as well as the non-technical organizational issues must be acknowledged and resolved. Technical issues include deployment options and accompanying hardware/software change. Non-technical issues are organizational problems that are often associated with software upgrades, such as employees' attitudes toward technological change. (Shaw, 2001)

"Job satisfaction and positive employee attitudes can be maintained only if technological change is managed well." (Krajewski and Ritzman, 1996, p.110)

After a review of relevant literatures (Benamati and Lederer, 2001; Farrow, 1997; Krajewski and Ritzman, 1996; Piderit, 2000; Shaw, 2001; Woulfe and Tinucci, 1998; Zarowin, 2000), there are nine key factors for a successful technological change:

1. Initial Planning and Budgeting

2. Communication

3. Education and Training

4. Management Support

5. Counseling

6. Employee involvement in decision making

7. Documentation

8. Vendor Support

9. Consultant Support

Initial Planning and Budgeting: This is the initial step for management to take by developing process to aid in the evaluation, acquisition and implementation of the new technology (Benamati and Lederer, 2001); and to plan the budget not only for the implementation but also for follow up resources such as maintenance, training, upgrades and emergencies. (Woulfe and Tinucci, 1998) Management could also perform an evaluation of the compatibility of and the differences between new and existing technology, and considering the success of other organizations in implementing the same technology as procedures that can facilitate successful implementation. (Benamati and Lederer, 2001)

Communication: Communication is always a big issue that is often overlooked by organizations everywhere. Management is responsible in communicating the

implementation of the new technology process to related business units within the organization and especially to employees who are going to use the new technology. Management needs to ensure that its employees are aware of developments and receptive to change, and most importantly that they need to understand why change is occurring. (Farrow, 1997)

Education and Training: Because the jobs that people actually perform are largely determined by technology, so that when technology changes so do jobs, therefore early education and training are essential in preparing them to cope with the change. (Krajewski and Ritzman, 1996) Benamati and Lederes found from their research that education and training were the most used coping mechanism by organizations that went through technological change. Management must stay informed of new technology as it becomes available and instruct or provide guidance in the new use of it. (Benamati and Lederer, 2001, p.195)

Management Support: Both literatures by Shaw and Krajewski and Ritzman pointed out the importance of top management's ongoing support through out the project of implementing the new technology. (Shaw, 2001; Krajewksi and Ritzman, 1996) Management must also form a team that represents all departments affected by the change to lead and coordinate the implementation project. This team should be lead by a "project champion" who promotes the project at every opportunity and who has contagious enthusiasm, and preferably have had experience dealing with the equipment suppliers [vendor]. (Krajewski and Ritzman, 1996)

Counseling: Counseling is a channel for employees to voice their fear and concerns about the change and is equally important as training. Through counseling employees could talk in an informal setting with someone who listens and cares. They also need to be taught during the counseling sessions how to cope with external

pressures and how to keep up with recent [technology] developments. These skills will play an important role in encouraging positive attitudes. (Farrow, 1997)

Employee Involvement in Decision Making: Involving employees in the decision making process makes them feel that their opinions are valued by the management, and therefore could help overcome resistance in a workforce. (Farrow, 1997)

Documentation: Comprehensive documentation is also essential in managing resistance to change, such as staff manuals, training aids and policy documents. (Farrow, 1997)

Vendor Support: Vendor is a good source to rely on for problem determination and resolution, customization to, interfaces with, and functional enhancement to the new technology. This technique requires supervision from the management because the vendor may need to be pressured. (Benamati and Lederer, 2001)

Consultant Support: Organization could engage external information systems (IS) professionals to help plan for, implement, problem solve, or provide ongoing support for the new technology. The downside of this method is it requires higher cost and therefore the least used coping mechanism by organizations that went through technological change. (Benamati and Lederer, 2001)

CHAPTER III

RESEARCH METHODOLOGY

3.1. Introduction

This research actually began when the researcher was still working in the IT Forecasting Group (ITFG) department, as a member of the Quality Assurance (QA) group. This position allowed close interactions with Demand Forecaster (DF) users, through answering phone calls, monthly meetings, training and workshops, and daily casual interactions.

DF users at XYZ Inc. face constant changing of the software as the result of software upgrades. Twice a year, the software vendor releases new versions of DF with new incorporated enhancements. Moreover, the software vendor practices two-versions-back support policy, which means it only supports two versions of DF software relative to the most recent release.

This situation forced XYZ and its DF users to be up to date in using the most current version of the software that is supported by the vendor. The challenge that the management faced was to encourage its users (business units) to migrate from one version to the next. At the time of study, not all of the business units used the current release, even though it has more enhancements and features and is easier to maintain from the database administrator point of view.

After the ITFG management announced the future use of web-based DF in place of the current windows-based sometime in the future, researcher began to hear comments made by DF users regarding this change. Most of the comments expressed their dissatisfactions of the web client.

Based on this situation, the researcher decided to conduct a research to investigate how DF users perceived and cope with the change, and what efforts the management provided to reduce resistance to change from its users. Ultimately, the goal of this research was to help both DF users and the ITFG management to effectively manage the change.

3.2.   Method of Study

Qualitative research method used in this study is case study research, which according to Myers (1997):

> Case study research is the most common qualitative method used in information systems [IS]. (Orlikowski and Baroudi, 1991; Alavi and Carlson, 1992) Although there are numerous definitions, Yin (1994) defines the scope of a case study as follows:
> "A case study is an empirical inquiry that:
>
> - investigates a contemporary phenomenon within its real-life context, especially when
> - the boundaries between phenomenon and context are not clearly evident" (Yin, 1994, p. 13). "
>
> Clearly, the case study research method is particularly well-suited to IS research, since the object of our discipline is the study of information systems in organizations, and "interest has shifted to organizational rather than technical issues" (Benbasat et al. 1987)

And, "Case study research can be positivist, interpretive, or critical, depending upon the underlying philosophical assumptions of the researcher." (Myers, 1997)

Information systems (IS) is a part of information technology (IT) and this research was about investigating the technological change in the IT field, which is software upgrades. Therefore, the researcher believed that case study research is the appropriate approach to use for this study. Data collection and analysis process were conducted by following interpretive research guidelines.

3.3.   Data Collection

A good case study uses as many sources as possible because the various sources are highly complementary. (Yin, 1994) The researcher used three modes of data collection in this study, which are participant-observation, document analysis and interviews. Each of these data collection process is discussed in the sub-chapters below.

3.3.1. Document Analysis

Documents used in case studies can take many forms and should be the object of explicit data collection plans with the most important used is to corroborate and augment evidence from other sources. (Yin, 1994)

Researcher used multiple documents for this research to include: XYZ's organization chart of its IT division, lists of 51 implementations of DF at XYZ, lists of DF users' evaluation results of web-based DF collected in the workshops facilitated by QA, and various news from newspapers about the software vendor's relationship with its other customers in implementing DF in general and the new web client in particular.

3.3.2. Participant-Observation

"Participant-Observation is a special mode of observation in which you are not merely a passive observer. Instead, you may assume a variety of roles within a case study situation and may actually participate in the events being studied." (Yin, 1994, p. 87)

As stated above, the researcher was part of the QA group within ITFG department. Major responsibilities that came with this role were testing the most recent DF software that has just released by the software vendor - to ensure that it contains all the new functionality, enhancements, and bug fixes promised by the vendor in its

release notes, supporting the DF software whenever there are problems countered by the users, and as the liaison between DF users and the software vendor.

The researcher took this opportunity to gather information using the participant-observation technique by observing and recording the behaviors of DF users and ITFG management toward the web client and the migration process.

3.3.3. Interviews

Interviews are the most important and essential source of case study because most case studies are about human affairs, which should be reported and interpreted through the eyes of specific interviewees who are well informed so that they can provide important insights into a situation. (Yin, 1994)

There are three forms of interviews according to Yin: open-ended nature, focused interview and formal survey. The researcher chose focused interview technique, where a respondent is interviewed for a short period of time –an hour, and the interviews were still remain open-ended done in a conversational manner and following a certain set of questions derived from the case study protocol. (Yin, 1994)

The researcher, before going in to the field, prepared two sets of interview questionnaire. The first set was intended for the DF users and the second set was intended for the QA analyst/product support person who represents the ITFG management.

Five interviews were then performed onto five research subjects. A tape recorder was used to record the answers and responses of the interviewees. The results of the interviews then translated into text (verbatim) to capture all the words and the real voices of the interviewees.

3.4.   Selection of Participants

"Getting only one side of an argument is not sufficient. You have to go for balance in your choice of interviewees, to represent all the divisions within the arena of study." (Rubin and Rubin, 1995) Therefore, participants were selected to represent both the DF users community and the management.

Five people were selected to participate in this research as interviewees. Four of them were people who use DF on a daily basis and have close interactions with the end users. They represented all DF users at XYZ Inc.

A QA analyst/product support for DF software was chosen to represent the ITFG management. This person interacts in two ways, internally within XYZ, interfaces all departments that use and support the DF software; and externally as a liaison between DF users at XYZ and the software vendor.

3.5.   Data Analysis

The transcribed interviews were than analyzed using coding and cut and paste techniques to find common themes among the participants. According to Rubin, "Coding is the process of grouping interviewees' responses into categories that bring together similar ideas, concepts, or themes you have discovered, or steps or stages in a process." (Rubin and Rubin, 1995, p.238)

Using various colors, each theme was color-coded according to its category with each color represents one category of theme. Similar themes were then grouped together by cutting and pasting them onto its designated pile of category. This process is easier to be done using a word processor, which substitutes the tedious manual way. (Rubin and Rubin, 1995)

The researcher then performed analytical interpretation based on themes found from the process above to disclose commonality and differences of opinions between the DF users and the ITFG management. These findings were used to answer the research questions stated in Chapter One of this report as results of this investigation.

This final result was communicated back to the interviewees for validation to ensure that the researcher has captured and understand their true meanings.

To conclude this research, recommendations then made to DF users, ITFG management, and the software vendor; and for further and ongoing researches performed in the similar field.

3.6.   Research Instrument

Prior to conducting the interviews, researcher approached the participants individually asking them to participate in this study. After they agreed to participate, they were asked to read and sign the human subjects consent form at the beginning of each interview. This form states that the participants agree to voluntarily participate in the research and understand that the data was to be kept confidential and the information obtained would be strictly used for the research project.

A tape recorder was used to record the participants answers to the questionnaire and to help the researcher concentrate more on her interviewees and to observe their body language and also to take additional notes.

Open-ended questions were used as a guideline to obtain information during interviews as provided below, whereas the first section was a set of questions intended for the DF users, and the second set was intended for the ITFG management representative:

Section One:

1. How long have you been using DF software?

2. What do you think about DF in relation to your work performance?

3. Have you seen or used the new web-based DF?

4. What do you think about the web client?

5. How would you compare the web client to the windows client?

6. How do you feel when you learn that the web client is going to replace the windows client and that you must use the web client?

7. What is your main concern in changing to the web client?

8. What have the management done in preparing you and the others for this change?

9. What have you done to prepare yourself for the change?

10. Is there any communication between you and the management regarding your feedback about the web client and the change altogether?

11. What would you suggest or do to make this migration better?

Section Two:

1. When will the use of the web client take effect?

2. In your opinion, what do you think of the web client in comparison to the windows client?

3. What have you done to prepare DF users for the migration to the web client?

4. What have you heard from DF users regarding the migration to and/or the web client?

5. How do you collect their thoughts?

6. What do you do with their input?

7. Any feedback or response from ITFG management regarding DF users' input?

8. What is your main concern about this migration process?

9. What do you do to ensure that this migration is successful?

CHAPTER IV

FINDINGS AND RESULTS

Coding both follows upon and leads to generative questions; fractures the data, thus freeing the researcher from description and forcing interpretation to higher levels of abstraction; is the pivotal operation for moving toward the discovery of a core category or categories; and so moves toward ultimate integration of the entire analysis; as well as yields the desired conceptual density. (Strauss, 1987, p. 55)

In this chapter the researcher tried to find the red thread among the themes emerged from the analysis process. This was the process of revealing the common themes among the respondents. Analysis was focused on finding respondent's opinions of the web client and the whole change process: what they like, what they dislike, what effort the management has done to help its people for the change and whether they felt it was adequate, and what were the obstacles in doing the migration. These are the questions that need to be answered in order to satisfy the research questions. Below are the findings and results of this research:

4.1.   Findings

4.1.1. Growing Pains

All respondents that were interviewed have at least two years of experience in using and/or supporting the Demand Forecaster (DF) software. Some of them had seen the software since its early stage being implemented in XYZ six years ago. These people have seen the software evolved over this period of time, from a product that was not very user friendly until it became a useful and functional product as it is now.

"So we went through a lot of pains to get the current NT (windows) client to the level of stabilization it is and the level of usability it is" as one respondent, Sean, described his experience with DF.

Another topic came into consensus that DF is critical to the participants and their end users since it is the only used to forecast XYZ's customer's demand. The existence of DF certainly makes their job easier compared to prior DF implementation where the applications used were not as flexible and sophisticated as DF.

Moreover, being asked what would they feel if they had to use the web client at this point, they argued that it will be a waste of time and energy after all the work they had done, as if they went back to the first time when they just started using the software. As Dave replied:

It seems that we're kinda starting all over again with the web client, is that

we have to go back to square one. And we're gonna have to go through

a couple of years of work again to get to the point where it's actually a

functional, useful, efficient tool to use.

4.1.2. The New Technology

"I think the whole point of the technology is to make their [end users'] jobs easier" according to Dave, which made a good point in looking at the bigger picture of the migration process at XYZ. The theory of bringing in new technology is to make people's job easier and not the other way around.

In conjunction with this, the respondents voiced their opinions and thoughts about the web client at its current stage. They were neither satisfied nor happy with the new web client. They didn't think that the web client is acceptable as a productive release. Furthermore, they described it as an unfinished product, an immature product,

an early stage of a software, and a product that is not ready for primetime and to turn over to the end users.

The bottom line was that the web client is more difficult and more cumbersome to use compared to the windows client, plus the fact that it does not have as many functionality as the windows client does.

The respondents felt discouraged and worried about their end users if they had to use the web client as it is now.

On the other hand, ITFG management was aware that there is resistance from DF users in using the web client, because of the huge gap between the web client and the windows client. To prevent discouragement to its end users, the management tried to minimize the exposure of the web client until there is a productive web client with the same level of usability as the existing windows client.

4.1.3. Advantage vs. Disadvantage

The researcher found that the respondents saw the advantages and the disadvantages of using the web client at its current stage.

The Advantages:

The advantage of using the web client was the ease of distributing, maintaining and testing the software. Whereas with the windows client, it has to be tested on different platform such as Windows NT, Windows 95, Windows 98 and Windows 2000 every time the vendor releases new version.

After the software is tested, it is placed on a specific server. Every DF user who intends to use the new version of DF must retrieve it from this server and install it on his/her PC. This should be done every time DF users are ready to migrate to a new version of DF.

With the web client all those processes would be simplified. The QA analyst would maintain the quality of the web client that is stored on a server and ensure that XYZ is using the most current version. The users would only need to connect to the web server via an Internet browser. They do would not have to worry to install the software every time they need to upgrade to the next version.

The other advantage of the web client is that users only need to log in once to the server and they can choose whichever database they need to work on. That is not the case with the windows client where users need to log in and log out each time they need to move from one database to another. Furthermore, because the DF software itself consists of three modules, which are the forecasting tool, the forecast reporting tool and the database administrative tool, once a user is logged in, depending on his/her security settings, s/he can move from one module to another without having to log out and log in again. This is, again, not the case with the windows client.

Another advantage of using web client is that it is accessible from virtually anywhere, wherever there is a connection to the Internet.

The Disadvantages:

The most apparent disadvantage of the web client is its performance and quality that has not yet reached the level of usability and stability as its users expected. According to the respondents, not only that the web client is not user friendly and more difficult to use, it also seems that the web client does not have all the functionality and capability of the windows client.

Since the web client is a whole new technology, and the look and feel of it are different than the windows client, the respondents agreed that there should be an extensive training and education program to let users become comfortable with the web

client, proficient in using it, and equalize them to the level of expertise they are now in using the windows client.

The respondents claimed that the training and education program would be an investment for XYZ, as Sean put it:

So I mean, if it took us this far to get to this level of expertise in the

company now, then how is it gonna take with the new piece? And what is

it gonna cost us, both in productivity and actual dollars? I mean,

redeveloping classes, redeveloping manuals, redeveloping operating

procedures for the administrators. It's an investment for XYZ also.

4.1.4. The Obstacles

There were several issues that XYZ management had to deal with if it wanted to roll out the web client. Migrating from windows-based client to a web-based client is not as simple as upgrading from the old version of software to the new one. The platform and the technology used to run the web client are so much different than the ones used to run the existing windows client.

The infrastructure to support the new web client has to be planned carefully. Physical hardware requirements, operating systems selection and web servers selection would be part of the decision to set up the infrastructure. XYZ had difficulties to bring up the web client so it is available to used, as noted by Kirk: "We don't even have web servers to put it on right now." Furthermore, other respondents were aware of the infrastructure issue because it was the biggest obstacle so far to run the web client.

The other obstacle was the lack of human expertise to set up the 'behind the scenes work' in order to run the web client. The economic slow down that has been striking America starting at the first quarter of 2001 had force XYZ upper management to cut down their workforce in order to stay competitive. This caused the ITFG

management the loss of the only expert it had, whose mainly responsibilities were to configure and set up the 'behind the scenes work' of the web client. This issue put a significant impact to the migration process on top of the infrastructure issue.

These obstacles might cause XYZ to subside its desire to roll out the web client. Again, that is something that XYZ cannot afford considering the push from the software vendor in releasing new versions plus their two-versions-back support policy. As stated by the QA analyst that the management's main concern in the migration process is pushback.

Another challenge for the management in rolling out the web client is the fact of the size of XYZ as a company. Currently there are 51 implementations of DF at XYZ; meaning that there are 51 product families forecasted using DF software, and the fact that XYZ had been using the windows client for almost seven years. It will, again, take a lot of hard work, education, and training.

4.1.5. To Be or Not To Be

The quality, usability, and stability of the web client that did not meet DF users' expectations and the huge investment that XYZ has to spend in infrastructure and training programs were all put into consideration as being the disadvantages of using the web client.

Weighing the advantages versus the disadvantages of implementing the web client at this point in time, the respondents believed that there were no apparent benefits to migrate to the web client. Moreover, since the only advantage of using the web client was the ease of distributing and maintaining the software from the management and the administrator point of view, it is not enough to justify the migration to the web client. As noted by one respondent, Elise, when asked the question of what is her main concern in changing to the web client:

First of all, the speed of accessing it and moving through out the

hierarchy. Secondly, the loss of some features that were fairly important

features that they don't seem to have built into the web itself. And third,

there doesn't seem to be a real apparent benefit. Usually when you go to

a new version there's some good things that have come with it. And I can

see a *few* good things. But I don't know if they'd be enough to justify off

sets the things that people will be losing along the way.

4.1.6. The Preparation

In preparing DF users for the migration process, ITFG management had done the

following actions, which are:

Demos:

 ITFG management (QA) had provided DF users with a couple of demos about

the web client in the monthly users' forum.

Updates:

In the monthly users' forum, ITFG management through the QA analyst also

provided DF users with updates on the software: release dates for the upcoming

versions, new features that will come with the new versions, bugs that had been fixed by

the software vendor, etc. The purpose of these updates was to make DF users aware of

the software's development and the directions that the software vendor and XYZ

management want to go.

Workshops:

 So far ITFG management had conducted four workshops for DF users who are

interested in looking at and getting hands-on experience with the web client. In these

workshops, users were given worksheets as a guideline in using the web client. The

worksheet was used as a tool to keep the users on the same pace of learning and also

to prompt dialogue among them. After each session, ITFG management represented by the QA analyst (facilitator) would ask the workshop participants for their thoughts about the web client.

The facilitator recorded all their comments, questions, suggestions and concerns that emerged from the workshop. This information was documented and sent as a feedback to the software vendor's development team to help them redesign and improve the web client. The upper management of ITFG also received this information so that they are aware of all the work that was being done in preparation to use the web client.

Using the document analysis technique used in this study, the researcher analyzed the documented feedback from the first workshop. It showed that from 33 comments the workshop's participants contributed about the web client performance, 9 of them were about the loss of functionality and/or features that once were in the windows client. There were 23 comments about the dislikes of web client's functionality and/or features and suggestions to improve those, and only 1 comment showed their approval of a new feature in the web client, which was the pop-up window feature. In addition, the respondents brought up 5 of the 33 comments during the interviews.

The purpose of these workshop sessions was not only to introduce the web client but also for the users to evaluate it, with the expectation that they can mold and shape the web client close to the level of functionality and usability that they want. As Kirk, the QA analyst, stated:

> [The ultimate goal of the workshops is] … to collect thoughts of the
> users, gather all that information and present it in a way that we could
> give it to the software vendor, for their development group to turn
> around and enhance the new (web) client in a way that'll benefit us.
> With 'us' I mean XYZ users.

On the other hand, Chloe made a comment that the workshop sessions were not considered trainings but evaluating. When there is a productive release of web client then the workshops would be considered as training.

At your own time:

ITFG management took a further step by enabling its users to use and evaluate the web client outside the workshops on their own schedule. This was a positive action from the ITFG management.

The respondents who took this opportunity complained that since the web client was still unstable they experienced the web client crashing a lot or being locked up when using it.

The respondents were all aware of these efforts from the management. Some respondents made a comment, though, that despite all the work by the management stated above, they still did not see any significant effort from the management.

4.1.7. Plan Ahead

ITFG management holds training classes for end users or business unit people who wish to learn about the DF software. Management had already have plans to have similar trainings for the end users once XYZ received a productive release of web client. These classes would be a one to two hour classes that would touch base on the differences between the web client and the windows client.

4.1.8. In the Management We Trust

Despite the current condition of the web client, the respondents were confident that there are some other potential that came with the web client. Likewise, they liked the idea of having a web-based client.

Moreover, they have faith in the XYZ management, in this case ITFG management, that the management would not force the migration upon DF users until the users believe that the web client has become a usable product and there are significant benefits to migrate to the web client.

4.1.9. What Lies Beneath

This investigation had brought the researcher to disclose the underlying problems and issues perceived by both users and management during the migration process.

With the two-versions-back support policy, the software vendor is dictating its clients to abide and move forward with their plans and vision with DF software. The respondents argued that the web client was not yet a usable software. They were really concerned if the software vendor keeps insisting to enforce its support policy while the web client is not a ready to use, then XYZ would have to deal with more problems that could lead to low productivity of the users.

In conclusion, the respondents resent the idea migrating to the web client just for purposes of support from the software vendor.

Deploying the web client is not the same as flipping a switch. It needs careful planning from the XYZ management because it involves significant investment in costs, time, human resources, and productivity. It seems that XYZ would have to redo its work like the first time it implemented the windows client six years ago.

The major hurdle for XYZ at this time was the infrastructure change, as Dave, one of the DF administrators, explained:

We actually have to go through a lot of work on that XYZ infrastructure

side I think, to get now web servers in place, and now the different

physical hardware to run this stuff on. So I see that as being a big

challenge that we can't just overnight put out this new version because

we need to figure out how do we best coordinate this, how many

databases you're gonna run per web server, how are that gonna work

out. And I think those are the kinds of things that will take a little time to

work out to get in place.

The respondents were concerned by the facts of the poor quality of the web

client, lack of infrastructure in place to run and support the web client, the software

vendor's two-versions-back support policy, and ITFG management's desire to roll out the

web client as soon as possible to keep up with the software vendor support policy. They

would like ITFG management to communicate with the software vendor more

extensively to deliver their thoughts so that "…they [software vendor] either release

things in parallel, so got that web client that we *can* use but we also have the C^{++} client,

or they don't enforce that two-versions-back thing."

It was interesting to learn that there was no migration strategy in place that had

been communicated from the upper management to related departments, groups and

individuals who have roles in the migration process. The ITFG management

representative, Kirk, put it this way: "We're kinda just still in limbo, I guess you can say."

4.2.   Results

The management involved users in the change process to let them voice their

opinions, which makes them more accepting of the web client because they know that

their input in the process is valued.

DF users who went to the workshops are getting more comfortable with the web

client now after they had been using it several times. Here is what Kirk told the

researcher:

It was interesting because at the end of each workshop I always ask for

people's reaction, kinda "What do you think", and keeping track of that

stuff. I really think that the second, third time and the last, the fourth

time, the last time that we had, people were more comfortable, you

know. It's like when they logged in, they're now used of the way things

worked. They may not agree with the way some stuff works, but they're

accepting it, though. They're like: "Okay, this isn't as bad as it was the

first time they looked at it". And that's simply because it was something

that you've never seen before. When you put something like that in

front of somebody and it's complex and it's not straight forward, you

know, people are gonna struggle with it. But it's just a matter of time

and putting the effort to understand how it works. I think people are

gonna be comfortable.

Respondents would like to standardize the process of evaluating web-client DF

through similar activity as the workshops. ITFG management also saw the benefits of

having the workshops and had agreed to continue the process with each release of the

web client.

Respondents did not feel that the web client is a useful and functional software

yet, and they did not see the benefits for XYZ to migrate to the web client at this time.

They agreed that the standard in measuring whether or not the web client is acceptable

is if it at a minimum reached the same level of usability and stability of the existing

windows client. Moreover, they believed that the software vendor still need to rework the

web client to the level that its customers demand through their feedback collected during

the workshop sessions.

There were major issues that XYZ had to tackle before it could implement the

web client. Internal issues such as the lack of infrastructure to support the web client,

the lack of human expertise to do the preparation (behind the scenes work), and on top of that the lack of migration strategy that needs to be communicated vertically and horizontally within XYZ.

External issues as how XYZ management best deliver the voice of its users to the software vendor regarding their objection of the vendor's two-versions-back support policy for the windows client being treated the same way for the web client. The respondents wanted ITFG management to be more proactive in finding out what the software vendor is planning to do with the web client and to be more proactive in communicating their opinions to the software vendor through discussions regarding the quality of the web client and the two-versions-back support policy.

In addition, the respondents also wanted ITFG management to be in close contact with the software vendor during this migration process, as quoted from Sean:

I think we have to stay in close communication with the software vendor.
I think we have some hurdles on the XYZ side being able to actually
deploy the software, but I also think that we need to be in close contact
with the software vendor to figure out how this is really gonna work if
they're really gonna enforce this two versions back thing and when this
thing is considered productive and when we…if…I guess what I'm saying
is I don't think we want to be forced to migrate by the software vendor.
Because of not wanting to make sure that we're still supported, I think
we'll need to being in close contact with them so that they understand
also that it's not just a matter of reluctant to upgrade to something new,
it's actually a matter of changing some things behind the scenes just to be
able to deploy it. So I think if that's communicated really well between
XYZ and the software vendor, I think they're not going to be as anxious to
kinda force people to get on to this web client. And if they'd understand

that they are just customers, have some hurdles of their own before they

can deploy it, I think they'll be reluctant to take them out of the loop and

just plow forward. So that's probably the biggest thing is… good

communication between XYZ and the software vendor.

Being in close contact with the software vendor is the key to have open

communication, so that failure in implementing the software that could cause loss of

profit and grief to the customer can be avoided. This fact was found when the

researcher conducted document analysis process by researching newspaper articles

that talked about the software vendor and its relationship with other clients beside XYZ

Inc.

There was an incident back in March 2001 where a multinational garment

company blamed the DF vendor for its failure in implementing the software. The

software vendor denied it by arguing that the cause of failure was because the garment

company did not follow the software vendor's implementation procedure. This issue

could have been avoided if these two parties had an open communication.

The respondents would like to receive response from the software vendor

regarding their feedback of the web client from the workshop sessions. If possible, they

would like the software vendor to discuss their feedback issue by issue. The

respondents felt that if they had received response from the software vendor, they were

being heard and all their work of attending workshops and evaluating the web client

were useful.

Based on the findings found from this investigation, there was a difference of

opinion between the ITFG management and the respondents on the topic of timing in

releasing the web client. ITFG management would like to rollout the web client as soon

as possible after getting the entire infrastructure in place.

On the other hand, all the respondents did not want to use the web client unless it has became a productive release and if there were any significant benefits from using the web client. "It's not just a matter of reluctant to upgrade to something new, it's actually a matter of changing some things behind the scenes just to be able to deploy it [web client]." said Dave.

To finalize the results of this study, the respondents strongly believed that there should be ongoing internal and external communications happening at XYZ, in order for the management to strategically deploy the web client without hurting its process and users.

CHAPTER V

CONCLUSIONS AND RECOMMENDATIONS

5.1. Conclusions

The results from this study showed that the IT Forecasting Group (ITFG) management and Demand Forecaster (DF) users disagreed on when to roll out the web client. The management intended for its users to start using the web client as soon as possible in order to keep up with the software vendor's release schedule and support policy.

On the other hand, the users argued that they were not ready to migrate to the web client because it was not a usable product, at least not yet. They wanted the web client to be on the same level as the existing windows client to be considered as an acceptable product. Moreover, if the management insisted to use the web client at its current stage, the users believed it would be a step backwards for them. Thus, they did not see any benefits in migrating to the web client at this point.

In addition, the users opposed the idea of migrating to the web client just for the purpose of the software vendor's support.

The ITFG management had done demos, software updates, and workshops for DF users in order to prepare them for the migration. However, the users thought that these efforts were still inadequate. Moreover, the users did not consider the workshops as trainings, but merely evaluations of the web client. They believed that trainings could be done only if the web client has become a productive release.

The research found that there were some obstacles for the ITFG management in rolling out the web client, which are the lack of infrastructure to support the web client,

the lack of human expert to perform the 'behind the scenes' work, the absence of

migration strategy, and the lack of a committee to plan and execute the migration.

Moreover, the research revealed the need of extensive communications in order

to have a successful implementation of the web client and to manage users' resistance

to change. The ITFG management must maintain both internal and external

communications. Internal communication would help the management communicating

the migration plan and its progress to the DF users and individuals and/or business units

who involved in the migration process. Furthermore, it is a channel for users to voice

their opinions, suggestions and concerns to the management regarding the migration.

Nonetheless, ITFG management must maintain its external communication with

the software vendor, because it is the vendor who will make the changes and

improvements to the web client. ITFG management must ensure that these changes

and improvements reflect users' feedback collected in the workshops.

5.2.   Recommendations

The researcher would like to make some recommendations to the parties

involved in the migration process based on the results of the study. Furthermore, some

recommendations also made for further studies conducted in similar field.

5.2.1. Recommendations for the ITFG Management

In order for XYZ to successfully implement the web client, below are some

actions that it could take to have a successful migration and to effectively manage its

users' resistance to change:

Initial Planning and Budgeting

XYZ should form a committee consists of individuals who represent departments and individuals affected by and related to the migration. This committee should brainstorm and formulate a migration plan that will then communicated to the upper management and to the related departments, including the DF users.

The migration strategy should include budget planning for the web client's implementation, such as hardware and other software requirements, trainings, maintenance, upgrades, human resource(s), and emergencies.

The committee will also execute the migration strategy and act as change agents. Finally, all procedures in planning and executing the migration should be documented for future reference.

Communication

Communicate the migration plan and its progress regularly to the upper management, related departments, and DF users to keep them informed.

External communication to the software vendor must also be maintained, by being in close contact with the vendor. Management must be more proactive in finding out the vendor's response to the feedback provided by DF users regarding the web client, and in communicating its users thoughts and concerns.

Employee's Involvement in Decision Making

One key factor in reducing users' resistance to change is for the management to involve them in the decision making process. It is a good thing to have DF users' representative in the migration committee stated above in order to have them involved in the decision-making activities.

Training and Education

Training program is a crucial factor in helping users coping with the change. The management through its migration committee must plan it carefully.

Training is an aid to introduce users to the new web client with expectations that they would feel comfortable and confident using the web client after completing the training.

Counseling

Management must also act as a counselor for its users, or assign someone to fill that role, to hear users' complaints and concerns about the migration compassionately.

Management Support

The management must show its ongoing support to its employees throughout the migration process.

Pressure the Software Vendor

ITFG management must pressure the software vendor on its two-versions-back support policy. It is obvious that with the software vendor's iterative software development practice, it should not enforce its two-versions-back support policy upon the web client. Instead, the software vendor and the ITFG management must conduct the iterative model of software development together, until a usable web client is produced.

5.2.2. Recommendations for the DF Users

First, DF users should be more cooperative with the ITFG management by participating in the workshops provided by the management to evaluate the web client. Ultimately, it will benefit the users since they are the ones who will use the web client.

Second, DF users should be more proactive in voicing their opinions, concerns and suggestions about the web client and the migration process to the management and the software vendor.

5.2.3. Recommendations for the Software Vendor

The software vendor must be more responsive to its client's inputs, by communicating its plan with the web client and by responding to the client's questions, concerns, and suggestions.

The vendor must also be more proactive in collecting the client's inputs. This could be done in a forum similar to the workshops held at XYZ, where both the users and the vendor can have open dialogue about the software.

Ultimately, the software vendor must review its two-versions-back support policy, whether it is applicable to the web client, if the vendor indeed uses the iterative software development process.

5.2.4. Recommendations for Further Research

The researcher believed that it is important to conduct further study of understanding the relationship between a software development company and its customers.

REFERENCES

American Psychological Association. (1997). Publication Manual of the American Psychology Association (4th ed.). Washington, DC: Author.

Benamati, J. & Lederer A.L. (2001). Rapid Information Technology Change, Coping Mechanisms, and the Emerging Technologies Group. Journal of Management Information Systems, 17(4), 183-202.

Brown, M.M. (1989). What are the Qualities of Good Research? In F.H. Hultgren & D.I. Coomer (Eds.). Alternative Modes of Inquiry (pp. 257-297). Washington, DC: American Home Economics Association, Teacher Education Section.

Emerson, R.M., Fretz, R.I., Shaw, L.L. (1995). Writing Ethnographic Fieldnotes. Chicago: The University of Chicago.

Farrow, J. (1997). Management of Change: Technological Developments and Human Resource Issues in the Information Sector. Journal of Managerial Psychology, 12(5).

Kanter, J. (2000). Have We Forgotten the Fundamental IT Enabler: Ease of Use. Information Systems Management, 17(3), 70- 77.

Krajewski L.J. & Ritzman, L.P. (1996). Operations Management: Strategy and Analysis (4th ed.) (pp. 110-114)). Reading, MA: Addison-Wesley.

Krell, T.C. (2000). Organizational Longevity and Technological Change. Journal of Organizational Change Management, 13(1).

MacCormack, A. (2001). Product-Development Practices that Work: How Internet Companies Build Software. MIT Sloan Management Review, 42(2), 75-84.

Melymuka, K. (2000, May 29). Mourning an Old System. Computerworld, 34(22), 50-51.

Myers, M.D. (1997). Qualitative Research in Information System. MISQ Discovery [On-Line]. Available: http://www.auckland.ac.nz/msis/isworld/

Piderit, S.K. (2000). Rethinking Resistance and Recognizing Ambivalence: A Multidimensional View of Attitudes Toward an Organizational Change. Academy of Management Review, 25(5), 783-794.

Rubin, H.J. & Rubin, I.S. (1995). Qualitative Interviewing: The Art of Hearing Data. Thousand Oaks, CA: Sage.

Shaw, N.G. (2001). <u>Strategies for Managing Computer Software Upgrades.</u> Hershey, PA: Idea Group.

Strauss, A.L. (1987). <u>Qualitative Analysis for Social Scientists.</u> New York: Cambridge University.

Taudes, A. (2000). Options Analysis of Software Platform Decisions: A Case Study. <u>MIS Quarterly, 24</u>(2), 227-243.

Waddell, D. & Sohal, A.S. (1998). Resistance: A Constructive Tool for Change Management. <u>Management Decision, 36</u>(8), 543-548.

Woulfe, M. & Tinucci, J. (1998). Six Things We Should Learn from Year 2000 Efforts. <u>TMA Journal, 18</u>(6), 98-100.

Yin, R.K. (1994). <u>Case Study Research: Design and Methods.</u> Applied Social Research Methods Series (Vol. 5) (pp. 78-100). Thousand Oaks, CA: Sage.

Zarowin, S. (2000). Technology for the New Millennium. <u>Journal of Accountancy, 189</u>(4), 22-28.