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DEDICATION

To my mother, Ruth Sandberg Gustavson, who encouraged me though the journey and who watches now with eternal vigilance as I take the final steps.

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# TABLE OF CONTENTS

## I. INTRODUCTION

- Year 2000
- Unique Characteristics of Y2K
- Crisis Events and Shock Learning
- Purpose of the Research
- Personal Interest in the Effects of the Y2K Event
- Qualitative Methods: Case study Approach
- Unit of Analysis
- Case Description: Kent State University IS Division
- Contextual Factors within the Kent State University IS Division
  - Corporate Culture Conducive to Learning
  - A Strategy that Allows Flexibility
  - Structure as a Contextual Factor
  - Environment of the IS Division
- Issues of Current Interest in Organizational Learning

## II. RESEARCH CONTEXT: LITERATURE REVIEW

- Organizational Learning in Perspective
- Systemic Levels of Learning
  - Zero Loop Learning
Summary: Areas of learning that emerged from Y2K…………………………………..101
Unit of Analysis…………………………………………………………………………..103
V. DISCUSSION…………………………………………………………………………..108
Overview…………………………………………………………………………………..108
Context for Learning: Integrated Perspectives within Y2K…………………………….112
Two approaches: Cleveland Division of Water and Kent IS Division…………………112
VI. CONCLUSION…………………………………………………………………………118
Constraints to the Study……………………………………………………………………120
Application………………………………………………………………………………….121
Recommendations for Future Research………………………………………………….122
Unit of Analysis……………………………………………………………………………122
The Role of HR in Organizational Learning……………………………………………123
Summary…………………………………………………………………………………..123
VII. BIBLIOGRAPHY………………………………………………………………………..125
VIII. APPENDICES………………………………………………………………………….141
APPENDIX A Methodology for Y2K Remediation at KSU…………………………….141
APPENDIX B Questions……………………………………………………………………144
APPENDIX C Y2K: An Odyssey in Learning and Change……………………………..147
viii
## List of Figures

<table>
<thead>
<tr>
<th>Figure 1</th>
<th>Map of key topics in organizational learning and knowledge management……30</th>
</tr>
</thead>
<tbody>
<tr>
<td>Figure 2</td>
<td>Integration of perspectives in Y2K................................................112</td>
</tr>
</tbody>
</table>
List of Tables

Table 1 Time Chart for Chronology.................................................................52
Table 2 Distribution of Participants...............................................................55
Table 3 Methods for Establishing Validity......................................................64
Table 4 Kleimann’s Employment Life Cycle Model........................................91
Table 5 Chronology for Organizational Learning in Response to Y2K..........107
Table 6 Summary of Major Themes in Y2K and 911....................................111
Table 7 Summary: Y2K in Cleveland Division of Water and KSU IS Division...117
Table A-1 Major tasks performed by the IS Division for the Y2K Project.........141
ORGANIZATIONAL LEARNING AS A RESPONSE TO LARGE SCALE EVENTS

Introduction to the Research

Organizational learning has grown in recognition and importance since it first appeared as an area of interest in the literature in the 1950s and 1960s when the notion of organizational learning emerged (Cyert and March, 1963; Easterby-Smith, Crossan, & Nicolini, 2000; Easterby-Smith and Lyles, 2005). Growing quietly, it exploded as a research topic into journals in the 80s and has advanced rapidly since (Crossan and Guatto, 1996). Now established as a field of study, the current material available on organizational learning is so extensive, it could not be covered in a single publication (Easterby-Smith, Crossan, & Nicolini, 2000). Organizational learning is dynamic and still evolving with new areas of interest emerging as other fade.

Organizational learning has been associated with successful strategy implementation, organizational performance and innovation required to maintain competitive advantage. Developing the capacity for organizational learning is a prerequisite to sustaining viability as a business entity. Senge (1990) cites the importance of superior learning over the long run to maintain superior performance. De Geus (1988) and associates found that a sample of companies surviving 75 years or more continued to exist because of their ability to experiment with new business and organizational opportunities that resulted in expansion of the business.

Organizational learning is a construct with multiple perspectives including denials by some that organizations can learn (Stacey, 2004).\footnote{Stacey (2004) locates learning within the interactions of people and denies that organizations can learn. His view is in sharp contrast to Margaret Wheatley (2002) who describes organizations as living systems.} Huber (1991) defines organizational
learning as a collection of processes that target the development of organizational competencies that support competitive advantage (Huber, 1991; Lines, 2004). Shrivastava (1983) indicates that organizational learning results from the firm’s prior experience with activities or decisions that result in the adaptation of its goals. “If learning is important to organizational performance, but is the outcome of processes that have been developed for and are performed within structures designed for other purposes, the relationships between such structures and processes and learning becomes an interesting area for research” (Lines, 2004, p. E1). This implies a need to focus on the natural work setting to begin to understand how learning occurs (Lines, 2004).

Underlying the work of most organizational learning theorists is the work of Chris Argyris and Donald Schön. Their early work culminated in the 1978 book, *Organizational learning: a theory of action perspective*. This research examines the perspectives of major organizational learning theorists but utilizes the framework of Argyris and Schön to guide the research. This framework defines organizational learning as a construct apart from individual learning, yet the two are linked (Argyris and Schön, 1978). Organizational learning is represented as an accumulation of the experience and actions of individual learners, i.e. organizations learn through the actions of its members. Organizational learning occurs when members, acting from their knowledge of organizational structures, discern a discrepancy, and take action to correct it. Organizational learning requires that discoveries by individuals in the process of correcting the discrepancies are subsequently archived or embedded in organizational memory (Argyris and Schön, 1978). The results of learning are adopted into the organizational framework. They become explicit.

Argyris and Schön (1978) distinguish among three levels of learning: single loop, double loop, and deutero learning. In single loop learning, individual members take action to
correct error by modifying conditions which would interfere with the organization carrying out its present policies or achieving current objectives. Double loop learning involves correction that challenges and revises existing organizational norms, policies, or objectives. Triple loop or deutero learning involves learning about the prior learning contexts and how to develop new learning strategies. In triple loop or deutero learning, the organization reflects on its past organizational learning experiences, develops new approaches and tests those approaches in implementation.

This research suggests that Organizational Learning, as presented by Argyris and Schön, is an appropriate analytical framework for understanding the impact of large scale events on the learning process.

During 1999, I directed a Y2K compliance project for the Department of Public Utilities in the City of Cleveland. As an observer as well as a participant in the project, I watched what I believed was a profound impact the work of the project had on the organization. Learning by team members was required to successfully achieve compliance and assure that the utilities would be serving customers as well after the date change as they were before. This conviction led to some smaller studies and ultimately to this dissertation topic. This experience provides context for the current study.

There are many lenses with which to view large scale events: crisis management and environmental shocks, as examples. The prevailing view has been that crises are “exceptional events,” “accidents and disruptions” and therefore inappropriate for learning (Roux-Dufort, 2000). The reaction to these major events tends to be defensive, and while executives and academics point to the unique opportunity to learn from these events, it has been generally observed that organizations just don’t learn from crises (Roux-Dufort, 2000).
Parallels may be drawn from the research about shocks in economics. Crises events bear some similarity to economic shocks, which are defined as unexpected, external events that create a change in such things as national income, production, and unemployment (Miles & Scott, 2002). Moore and Shaller (2002) modeled the impact of shocks with the inclusion of learning as a factor in understanding changes in an investment environment. They studied firms’ investment behavior based on perceptions of transitory and persistent economic shocks. Firm’s behavior differed based on their interpretation of the shocks as confirming or challenging existing beliefs and assumptions (organizational frameworks). Learning occurs when the presence of shocks challenges the firms’ basic beliefs and expectations. The ideal response would be introspective and retroflexive, examining values, assumptions and beliefs. The simulated firm’s response is influenced more significantly by their perception of the sequence of the shocks, and, also, when they are less certain about their belief structures.

Organizational learning focuses on the learning processes within an organization, usually from an academic point of view (Easterby-Smith and Lyles, 2005). This research proposes a case study of organizational learning in the context of a large scale event. The Y2K millennium date was chosen as a context for study. The IS Division coordinated compliance activity all over the campus and was in the heart of the Y2K response.

This is an interview study conducted in the Information Services Division of Kent State University. At the time of Y2K, the Information Services Division was a part of the Finance Department and was assigned the responsibility of overseeing Y2K assessment and correction of all IT systems on campus. This Division was selected for this study because of the depth of its involvement in the Y2K remediation work. The Y2K project was led by Dr. Paul Albert who was recruited from a research section to the Division for the Y2K work. He remains with the Division as Executive Director.
Data were collected from employees of the IS Division who were selected because of their direct participation in the Y2K project. Archival data in the form of progress reports was also utilized. Learning was examined for its potential “flow” over the designated time period. Responses that occurred around the events were collected as well as responses that occurred during the periods between events. These significant events are briefly summarized below.

Year 2000

Y2K was one of the two seminal events that took the information age into the third generation. The other was the Internet/dot.com boom/bust. Prior to those two events, which ran parallel and were a long time coming but began to be visible around 1995, "IT" was almost never discussed by corporate boards and the term was almost never used by the mainstream media. By 2000 this had totally changed -- "IT" was a term understood by almost everyone and almost no boards failed to discuss it. Why? Y2K, aside from many other things, showed leadership at every level of society the risk of doing IT wrong; and similarly the Internet showed them the potential rewards of doing IT right. (Dr. Leon Kappelman, Professor of Information Systems, University of North Texas, Director Emeritus, Information Systems Research Center, Fellow, Texas Center for Digital Knowledge, personal communication, December 6, 2007)

The Year 2000 (Y2K) brought numerous challenges to business organizations as software and component technologies that did not properly recognize the date change threatened to fail, seriously interrupting normal business functions around the world. A campaign involving millions of IT professionals worldwide was launched to identify and correct faulty systems. Nations came together in an unprecedented spirit of cooperation, working against an immovable deadline to avoid disaster. After spending billions of dollars and countless hours of remedial work, corrections were made and the millennium date changed without incident. Y2K remediation was declared a powerful example of success by Y2K team leaders throughout the world. Yet, little has been done to examine the impact on organizations of that profound event.

Y2K remediation projects represent an investment of billions of dollars by government and private industry globally to prevent widespread technology failures. Scale
alone makes the Y2K phenomenon worthy of study. Beyond the cost, there were other unique issues. Y2K was a problem created by technology, but human intervention was needed to resolve it. Potential failures attributed to Y2K would have resulted in social, political and economic hardship worldwide (Peterson, et al., 1998; Wheatley, 1998). There were predictions of worldwide depression and disruption of all major systems: health care, utilities, governments, transportation, as examples (Wheatley, 1998). Involved industries included: securities, insurance and health care, banking, government, transportation, telecommunications, utilities, pharmaceuticals, manufacturing, package vendors, small companies (Ulrich and Hayes, 1997).

Litigation was a risk for all industries and organizations (Ulrich and Hayes, 1997). Potential legal action could be initiated by shareholders, customers, business partners, or other entities at risk for financial harm. Y2K remediation teams were highly motivated by a fear of drastic consequences. According to one report, the estimated cost of the legal bills for business and litigation issues could total one trillion dollars (Keeva, 1998).

Litigation fears resulted in detailed documentation, a legacy of data for study. The Intergovernmental Advisory Board and its affiliates compiled data published in the “Silver Linings” report (Koskinen, 2000). Each one of the millions of ‘experts’ involved in Y2K remediation work in private and public enterprises, at the federal, state and local levels has a story, all part of the Y2K legacy.²

Y2K was a remarkable human endeavor, remarkable because of its massive success, because of the human capital it mobilized, because of its tremendous cost in dollars and time, and for the new technology platform it created as infrastructure for going forward into the

² The stories from all events were solicited and collected as data. Stories are, at times, rich representations of tacit knowledge. Stories are “constructed, creatively authored, rhetorical, replete with assumptions and interpretive. (Riessman, 1993, p.5)
millennium. For the years prior to Y2K, businesses shifted focus from productivity to Y2K disaster prevention. None of the dire Y2K predictions has occurred, and the challenge of Y2K remains largely unstudied – perhaps because there were no disastrous occurrences. No life was lost.

**Unique Characteristics of Y2K**

The Y2K event represented several significant characteristics. First, Y2K was novel and organizations faced challenges that demanded a new set of responses. Humans created the problem but technology was required to resolve it. The impact of the failure to comply with corrections required by Y2K was speculation. Little was known of the actual effect. Code corrections were important, but equally important was the tracking of interdependencies among networks, from the interconnectivity of the power grid that feeds and distributes electricity to the nation, to the interconnectivity of financial institutions internationally, to local business to business networks. Costs of Y2K corrections were unprecedented, exceeding $3 billion, worldwide (Brown, et al., 2000).

Following WWII, Reg Revans, formerly a physicist who became a manager, found that experts and the expert body of knowledge were of no help in keeping up with the rapid changes in the post-war years (Fulmer, Gibbs and Keys, 1998). He concluded that unless organizations learned and changed at the pace of the environment, they were destined for failure. He assembled action learning teams and focused on formulating questions to generate learning rather than relying on existing knowledge. “When in the epoch of change, tomorrow is necessarily different from today, and so new things need to be done – what questions need to be asked before solutions are sought” (Fulmer, et al., 1998, p. 8)?

Also, continued viability demanded a response. Failure to act or delay could not be considered. Organizations were required to respond with Y2K corrections worldwide to retain
the continuity of shared systems. Maintaining financial transactions internationally was a priority.

Massive resources were required, over $3 billion worldwide in Y2K.

A system-wide response was demanded. The entire organization and its network were involved in responding. Y2K represented a threat to all networked organizations and those with automated equipment that contained computer chips. In the Division of Water, the administrative services as well as the plant operations were involved in correction. The interconnectivity of the network spreads the impact system-wide, and the entire system is involved in the detection of error. In addition to technical response, employees were involved in cataloguing, education, purchasing activities, managing overtime, etc.

Technology infrastructures were threatened or disabled. The effects were not localized; dependencies, on other parts of the organization and on other organizations were uncovered and new relationships recognized. Margaret Wheatley (1999) describes our dependence on computers: “Our reliance on technology has created a world whose efficient functioning in all but the poorest and remotest areas is dependent on computers….The world’s economic and political infrastructures rely on computers…We are supported by complex networks of reliance around the globe. And what happens in one part of the network has the potential to impact any other part of the network. We have created not only a computer dependent society, but a planet whose interdependencies extend far beyond our imagination…Y2K quickly exposes those interdependencies, and it also reveals something we already know from experience – these complex systems are exceptionally fragile. They crash because of a failure in any part of the system” (p. 2).

The country’s infrastructure in Y2K as a large scale event was threatened, leaving our networks vulnerable to failures.
Y2K was not a surprising event, however, it can be considered to have a shocking impact. The awareness of Y2K began in the mid 1990s and the shock occurred when organizations and practitioners realized the extent of the problem.

These elements: forced novel responses, broad system-wide response, mobilization of massive resources, involvement of technology at the infrastructure level, and the exposure of new relationships, could be considered as potential conditions for stimulating new ways of looking at the organization and consequently, new learning.

Crisis Events and Shock Learning

Crisis situations are characterized by conditions of “uncertainty, ambiguity and time pressures are aggravated…” (Roux-Dufort and Vidaillet, 2003, p. 87). The emphasis in crisis response appears to at two levels. First, numerous studies show that managers revert to familiar norms and patterns to handle the event; however, additionally, in some cases, improvisation is used to devise an alternative solution to relieve pressure of the crisis event (Hutchins, 1991). In Roux-Dufort and Vaidailet’s study of firefighters, it was observed that “the stakeholders involved in the crisis persisted in repeating their habitual practices for the whole duration of the crisis; whereas, in the view of certain characteristics of the situation, one could have expected the emergence of improvisational processes” (Roux-Dufort and Vaidailet, 2003, p. 88). The assertion is that managers endeavor to restore the situation to the status quo as soon as possible and engage in a normalization process rather than seeing the event as leverage for change (Roux-Dufort, 2000). Managers avoid the opportunities that exist in crises to examine organizational assumptions and beliefs, question values and search for meaning.

Learning in the presence of shocks as applied in the field of macro-economics is a much more dynamic construct: shocks are external changes that produce internal changes (Miles and Scott, 2002). Moore and Shaller’s (2002) study on firms’ reactions to changes in
interest rates shows distinct differences in their simulated model run with and without learning as a factor. Organizations can learn to distinguish the effects of persistent and transitory shocks on their previously held beliefs about the stability of the interest rates and in discerning the reality of interest rate changes. Also, better fitting models are obtained with learning as a factor (Moore and Shaller, 2002). It is this dynamic effect of crises that this study intends to explore.

**Purpose of the Research**

The Y2K millennium event changed life in this country. It was a novel event to which organizations were forced to adapt. Within the context of Y2K, the purpose of this study is to explore the substantive theory of organizational learning as well as the methodology utilized in the research, specifically with respect to the unit of analysis, interactivity of effects, and the use of a contextual framework. The research takes a qualitative approach.

The research is directed at understanding if, how and why learning took place in this crisis situation. Can organizations benefit from structuring these events as opportunities for learning? How can studying the responses to Y2K add to the body of knowledge about the learning organization? Is more gained from taking an organizational learning theory perspective to uncover the potential advantage in large scale events?

This study looked for instances in which organizations may shift emphasis from a traditional crisis approach to a learning framework. Crisis events, often complex, are perceived as uncertain and ambiguous, often lead to poor judgment and reliance on past behaviors (Roux-Dufort and Vidaillet, 2003, Ladec, 1991; Weick, 1993). Crisis management does not promote positive learning. Where a response in crisis management tends to be restorative, returning as quickly as possible to the status quo, a learning experience, on the

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3 In Chinese, the word for crisis implies both threat and opportunity. (Roux-Dufort, 2000)
other hand, is goal directed. It is future oriented and outcome directed. Organizations that adopt a learning perspective and can begin to understand that the power of learning in the face of disruption can achieve organizational and thus strategic objectives.

**Personal Interest in the Effects of the Y2K Event**

In the year prior to the millennial date change, I headed a team responsible for the assessment and remediation of equipment used in the production of power and water for the city of Cleveland. An account of this experience, part of an earlier work on this subject, is included in Appendix C. The effort was system-wide. All work was performed internally. Y2K was an unknown, and the only way we could hope for success was to learn.

Unlike many other projects in the Cleveland Division of Water, the Y2K Project was outcome rather than process-focused. The goal: to create a condition after the date change in which all equipment was functional and all customers in the City of Cleveland service area were served. The goal was not articulated as a problem but, rather, as a positive achievement. This is a key distinction.

Early in the project, I began to believe that activities undertaken as part of Y2K could have an important effect on the organization. This was reinforced after observing a team of three engineers conduct a week-end marathon to review every piece of water processing equipment in all plants and pump stations. The team was as diverse as their experience and tenure with the Division. They represented three different engineering disciplines, electrical, mechanical and biotechnical, and they originated from three countries, Greece, Palestine and Puerto Rico. Their tour began on a Friday afternoon, and during the 60 hours that followed, they climbed through the bowels of each water producing facility, five major plants and 36 smaller pumping stations, touching and assessing every piece of equipment. As I watched their
progress, it occurred to me that they were amassing huge quantities of experiential data in a very compressed time frame, gaining a total real-time view of the system, a panorama.

In addition to the week-end “tour,” the engineers constructed schematic maps for each facility, showing the equipment and its interconnections, color-coding the risk status of each piece of equipment, which could be read by non-experts. The cognitive experience was accompanied by a graphic reinforcement. This, I believed, would create greater comprehension of the system, its functions, its components, and its interrelatedness, and their experience would be stored as a basis for innovation.

There were other effects. Throughout the project, new leadership emerged as the result of broad internal demands for added skills. Because a systems approach was used, both internal and external dependencies and impacts were defined and shared. The assessment and remediation was successful in eliminating any disruptive events; but there were added benefits: it created a “clean climate for organizational advance. The organization’s systemic approach corrected not only at-risk equipment, but also dysfunctional managerial processes that could threaten the efficiency of organizational response. Because Y2K dealt with interconnected systems, all potential connectivity was examined. And, because it was widely believed that any error occurring within this timeframe would be attributed to Y2K, the organization endeavored to correct any potential “glitch” that could be attributed to man or machine, directly or indirectly affecting the system.

The impact of the project on the organization was profound. Boundaries were “busted,” and stove-pipe like barriers among the sections were shattered! Information about operation of the organization was broadly shared for the first time. Internet connections were enabled throughout the organization to aid shared learning and to have access to internet
resources. The organization came to see itself in the light of newly revealed relationships internally and with other organizations upon which it depended.

This experience seemed to contain all the elements of organizational learning. Using Senge’s (1990) disciplines, I could identify elements of the learning organization: *systems thinking* - the connectivity of events in a pattern; *personal mastery* – increased levels of proficiency and knowledge of the system; *mental models* – “deeply ingrained assumptions, generalizations, or even pictures or images that influence how we understand the world and how we take action” (p. 8); *building shared vision* – the ability to hold in mind a vision or picture of a future condition shared among a leader and followers; *team learning* – teams “thinking together” to uncover insights that individuals alone could not achieve (p. 10). The extraction of tacit knowledge is implicit in all of these component technologies for learning.

“When… five component technologies converged to create the DC-3 the commercial airline industry began. But the DC-3 was not the end of the process. Rather, it was the precursor of a new industry. Similarly, as the five component learning disciplines converge, they will not create the learning organization, but rather a new wave of experimentation and advancement” (Senge, 1990, p. 11).

**Qualitative Methods: Case study Approach**

Hatch (2002) cites Yin (1994) and Merriam (1988) as the best sources for case study definitions. He represents their case study paradigm as a “special kind of qualitative work that investigates contextualized contemporary (as opposed to historical) phenomenon within specific boundaries” (Hatch, 2002, p. 30). This is also known as naturalistic inquiry, an alternative to the traditional positivistic methods of research involving hypothesis testing (Smith, 1981; Holt, 1991).

“Naturalistic research is disciplined inquiry conducted through personal, long-term contact between researcher and the object of the research. Rather than arbitrarily operationalizing the elements and specifying hypotheses in advance of the contact with the case, the meanings held by persons involved with the case are allowed to emerge from the data and thus become the objects of study” (Smith, 1981, p. 585).
The case here is defined as the process of organizational learning within the Kent State University IS Division prior to and during Y2K. The period covered in the study starts at the beginning of 1998, when the need for Y2K correction was recognized within the Division, to the present. The design of the study includes activity in the time periods immediately surrounding the event and any follow-on or resultant activity that occurred in the periods between the events. The selection of case study method and utilization of case study techniques will be discussed further in Chapter Three.

**Unit of Analysis**

The unit of analysis is the process of learning that occurred or failed to occur within individuals, groups and the organization during the period studied. An assumption can be made that organizations are always learning, but to what level and how? *Learning* as a unit of analysis represents a departure from the more traditional focus on the individual or the organization. Studies seeking to quantify the occurrence of organizational learning tend to embrace a macro perspective and adopt the *organization*, or groups within the organization, as their unit of analysis (Easterby-Smith, et al., 2000). Those using less structured methods such as participant observation tend to adopt the *individual* as the unit of analysis and use interview data, including story telling and narratives, to derive meaning (Easterby-Smith, et al., 2000).

The unit of analysis, i.e., the learning that took place within the organization during the time period studied, provides a roadmap for framing the research. Learning takes into consideration when and how the organization began to apply the new information and what were the events and practices surrounding the application of material learned.

By this definition, the unit of analysis is a thread that is laced through the case from defined start to finish. As a metaphor, one could imagine flowing down the river in a boat, examining the landscape on either side, observing the sky above and the pace of the river as it
moved the boat along. The approach taken to defining the unit of analysis is consistent with the more recent emergence of new units of analysis such as activity systems (Engestrom and Middleton, 1996) and “ecologies of knowledge,” (Star, 1995). These definitions are a departure from more traditional units, the individual or the organization (Easterby-Smith, et al., 2000). The new trend of work in organizational learning is to look at “detailed, concrete practices” to advance the understanding of organizational learning processes in new directions. This direction is more capable of creating operational implications that aid and sustain learning in the workplace. (Easterby-Smith, et al., 2000). Learning as a unit of analysis in this study moves beyond the study of practices into the study of processes and is unique in that regard.

Organizational learning in this study is associated with complex, large scale events. This raises questions. Are there other units of analysis within the same data set? What are they? Other units present possibilities for additional analysis.

The approach used in this study was influenced by the work of Maxwell (1996) and Yin (1989, 1993). Maxwell’s model is interactive, allowing for iteration among five major components of the design: Purposes, Conceptual Design, Research Questions, Methods, and Validity. The components are related, but not linear, as they influence and modify each other. The connections among the components are elastic and flexible to allow for “give” in the process (Maxwell, 1996). The components serve as focal points around which decisions about the research are made. Interactivity is stressed: the components are connected logically, and design decisions were interactive, with multiple associations among the components. Decisions about one component are made with the others in mind, for example, data collection methods are attached to questions of validity (Maxwell, 1996).
The time period begins about 1 ½ years prior to the millennium data change and continues through the present, about 6 years. It is a retrospective study based primarily on interview data.

Stake (1993) defines three types of case study: intrinsic, instrumental, and collective. An intrinsic case study is undertaken to better expose one particular case because it is of interest (Stake, 1993). Its intent is not to build theory or to better understand a particular concept, but to study a case for its own sake, for all that it may contain of interest. The second type is an instrumental case study, in which “a particular case is examined to provide insight into an issue or refinement of theory” (p. 88). The case is examined in detail to aid in the understanding of an outside interest, i.e. studying the case will illumine or advance understanding another concept or theory. The third type, the collective case study, is an “instrumental study extended to several cases” (Hatch, 1993, p. 89). The cases may be similar or dissimilar, but are chosen because, in some way, they can contribute to a better understanding a particular phenomenon or theory.

By Hatch’s (1993) definition, this is an instrumental case study, undertaken to further the understanding of organizational learning. As a single case study, it is designed to enhance the understanding of events in the case by which we measure the value of the results of the study (Stake, 1993). Its nature is exploratory and not an attempt to validate hypotheses.

Studying a case in depth, or “learning from the particular case” (Stake, 1993, p. 94) is well substantiated among major qualitative researchers (Campbell, 1975; Yin, 1989); its benefits are derived from how the case is like and unlike other cases, although a hard focus on comparison is believed to diminish the results (Stake, 1993). The result is what is unique about the case, usually in terms of the nature of the case, its history, physical location, economic, political, legal influences, related cases and participants. (Stake, 1993). The
instrumental case is often blurred with the intrinsic case study. However, Stake (1993) sees no problem with the convergence. While the case study can contribute to generalization, generalization as a goal can detract from the purposeful intent of the case study which is to understand elements of the case itself (Stake, 1993).

The study explored both the methodological (with respect to the unit of analysis and contextual framework) as well as the substantive theory of organizational learning. Theory was used as a framework for final analysis and interpretation of data. Meaning was derived from the data, itself, and conclusions drawn. Conclusions, then, were considered in terms of current theory and debates. Research questions include: Did learning occur within the IS Division in response to two major events? What was learned? How? When did learning occur? By whom? What was the effect on the IS Division as an organization?

Case Description: Kent State University IS Division

Contextual Factors within the Kent State University IS Division

Fiol and Lyles (1985) discuss four contextual factors that influence the probable occurrence of learning: “a corporate culture conducive to learning, a strategy that allows flexibility, an organizational structure that allows both innovativeness and new insights, and the environment” (p. 804). These contextual factors are reviewed below as they relate to conditions within the Kent State University IS Division.

Corporate culture conducive to learning

The best insight into the culture of the IS Division as the millennium approached may be obtained from an assessment of the Division by a team of CIOs from the University of Toledo and Pennsylvania State University. The team had been called in by the acting director of IS to make recommendations for the Division’s strategic direction over the ensuing 5 years. The team had been called in because things were not going well in the Division. The Division
had suffered under budget constraints – a flat budget for 7 years. Programs were being
cancelled. Two major project implementations were in trouble: Y2K and a large network
project. Staff members were leaving either to take better jobs available in the Y2K labor
market, or because morale was poor (one section, Applications Development, had been
discouraged from advancing their work). Turnover was high for both administration and line
workers. Several unfortunate decisions weakened the Division’s management of the Student
Information System which had an impact on several important Divisions: Financial Aid,
Bursar, and Housing.

The university had been moving toward a decentralized structure with regard to IS as
more of the Divisions were taking on the responsibility for their own IS functions. This was
evidenced as other client Divisions took on more of their own IS staff and used them well. The
Assessment Team saw this as a trend toward distributed participation and that the IS Division
could benefit from establishing a partnership with their distributed partners. This was a
hopeful trend if a ‘glass half full’ approach was taken.

The Assessment Report portrays the IS Division as somewhat depressed and tentative.
Leadership had changed. Resources were strained. However, in listing of the strengths of the
Division, the team included: positive staff attitude, staff is respected by user departments, staff
view change as an opportunity. Staff are dependable and interested in new technology, staff
are cooperative and conscientious, interested in personal advancement as well as advancement
of the department. Weaknesses included, “high turnover at the management level, insufficient
staff, lack of funds for continuing training, lack of definition in career development.”

* A strategy that allows flexibility

The Assessment Team made recommendations that were fiscally and operationally
sound and would allow the IS Division, overtime, to recover from past unfortunate decisions.
For example, stabilization of programs running on a DB/2 platform was recommended while the Division moved toward web-based programs.

The team interviewed members of the University Committee on Technology, who admitted that “an integrated plan for information technology was lacking” (p. 6). Failure to have a plan in place was causing failure to coordinate resources, to prioritize and to connect the budget process with IT priorities.

Prior to Y2K, there appeared to be no cohesive strategy that would advance the interests of the Division or other departments in the university.

**Structure as a Contextual Factor**

At the time of Y2K, IS was a Division of the Department of Finance, responsible for telecommunications and installing, implementing and maintaining hardware and software applications across campus. Organizationally, IS Division was structured into three sections: Applications Development, Systems Support and Client Services representing 38 managers and analysts, overseeing the computer labs, Help Desk, desk top support, engineering and operations, Data Centers, telephones, Educational Technology and distance learning. Networking was a separate section of the Division.

As mentioned earlier, the Division was experiencing a trend toward decentralization in which the other Divisions in the university were acquiring their own IS staff. It was suggested by the assessment consultants that the Division take advantage of this trend by partnering with their clients.

**Environment of the IS Division**

Media coverage warning the general public of the potential disruption that could be caused by Y2K failures was pervasive. Y2K was a high priority within the university. This was reflected in the concern that any failure of computer systems could result in severe
Residisruption of university operations. However, the university climate was positive. “The economy was doing well, enrollment was up and state funding which had been reduced year after year during the 1990s was increasing slightly (Dr. Paul Albert, Executive Director, KSU IS Division, personal communication, November 8, 2007).”

The IS Division as a context for learning would be rated at least fair. The academic setting sets a tone for learning, and, although the consultants’ report describes low morale, it also describes workers as having a positive attitude and viewing change as an opportunity, cooperative and interested in new technology. The university environment was positive and IS Division Administration was seeking improvement. Its detriments had more to do with depressed financial conditions and inability to advance programs and perhaps lack of planning. New leadership came on board in 1999. Dr. Don Tolliver, an administrator with a library background, headed the Division.

**Issues of Current Interest in Organizational Learning**

Current and emerging research indicates that the focus of interest in organization learning has shifted away from debates over individual versus organizational learning, cognitive versus behavioral learning, learning and unlearning, organizational learning and the learning organization, and levels of analysis (single, double loop learning) to current and emergent themes of the nature and location of learning, the unit of analysis, how to investigate organizational learning, and territorial disputes of among concepts, e.g. the clash between proponents of organization learning and knowledge management (Easterly-Smith et al., 2000).

Of interest in this study are the issues of

- location or construction of learning as occurring in social interactions among individuals, in contrast to learning occurring within the heads of individuals or in organizational structures; emphasis in the field is given to the socio-
cultural aspects of learning and acquiring knowledge and communities of practice (Easterby-Smith, et al., 2000),

• new approaches for investigating organizational learning, i.e. taking practice and activity as the units of analyses. The unit of analysis in this case is non-traditional, and is defined as a process, that is, the learning that occurs during the period of study. This definition differs from prior approaches that have studied changes at the individual participant, group or the organizational level, and

• the current movement toward integration between organizational learning and knowledge management (Vera and Crossan, 2005)

This research examines responses to Y2K by individuals, groups and the organization as a whole. However, the design also considers interactional effects among elements of the study as well the elements of the contexts of occurrence (Easterly-Smith, Crossan, and Nicolini, 2000), i.e. how do the participants interact in groups and groups with the organization as a whole? How do individuals and groups interact with the influences in the context of Y2K?

The contexts are: a growing technology division within a large state university, large scale events that had, in the all the instances, broad international significance and impact. Urgency was also a defining quality. Y2K took place within a climate of urgency to complete all needed correction by December 31, 1999.

The key question examined by this research is: Did learning occur? For this, I turn to the work of Argyris and Schön (1978) for a defining framework.
CHAPTER TWO

Research Context: Literature Review

In qualitative research, the purpose of the Literature Review is not so much to describe the field of inquiry, but rather to illumine those areas that are under scrutiny in the study (Maxwell, 1996). What are the problems, issues related to area of study? The role of theory in qualitative research is more to aid interpretation of results rather than defining propositions or hypotheses at the onset. The literature review begins to frame some of the issues in organizational learning theory and related research in economics (response to shocks), in knowledge management, and in crisis management. A perspective of current debates in organizational learning by Easterby-Smith, et al. (2000) has been particularly helpful in that regard.

Research questions are drawn primarily from the work of Argyris (1976) and Argyris and Schön (1978) on system levels of learning; the impact of shocks on learning (Moore and Shaller, 2002; Fulmer, 2004), drawn from economics; crisis management research (Roux-Dufort, 2000, 2002) which helps illumine the attributes of large scale events and explain the failure of organizations to learn during these events. In this study: (1) theories in this study were used to help frame research questions and to support final analysis and interpretation of data; (2) meaning was derived from the data itself and conclusions drawn; (3) these conclusions, then, are framed in terms of current theory and debates.

Organizational Learning in Perspective

Organizational Learning has developed rapidly as a field of interest over the past ten years. The literature has expanded to show both diversity and specialization (Easterby-Smith...
There was little activity prior to 1990, and most of the sub-area literature dates from 1995. As a part of specialization, debates have arisen, but in spite of the controversies, citations demonstrate remarkable consistency.

Argyris and Schön’s 1978 book, *Organizational learning: a theory of action perspective*, is an important foundational work that clearly defined the field of organizational learning and distinguished among organizations that were and were not capable of participating in organizational learning. Argyris’ work is built on his years of consulting from which he developed thousands of case studies. His conclusions are drawn from his case models. Argyris and Schön’s concepts of single, double, and triple or deutero learning are the frames of reference for assessing learning in this study.

The perspective in this study agrees with Argyris and Schön (1978), Vera and Crossan (2005), and many other theorists who stress the relationship between cognition, the ability to acquire knowledge, and behavior, reflected as a change in the way of doing things. “Individuals and groups learn by understanding and then acting, and then interpreting” (Crossan, Lane, White and Djurfeld, 1995; Vera and Crossan, 2005, p. 123). Argyris’ implementation validity tests a concept by requiring its implementation as a measure of validity.

Organizational learning requires an understanding of the justification for using terms such as organization learning. A discussion of organizational learning is liberally infused with terms such as organization intelligence, organizational memory, and organizational action. Argyris and Schön (1978) explained their perspective on the organization which begins when individual members come together with a common purpose or interest. An organization evolves as the members create a process for decision-making on behalf of the organization, designating members to act as authorities for the members, and creating boundaries that
distinguish the organization and the world. Once these conditions have been established, the members can say “we,” and there is an organizational entity that can act. The organization persists as long as the rules and governance continue. From this point forward, it is possible to observe the organization’s theories in use, decisions and actions carried out in the name of the organization (Argyris and Schön, 1978).

According to Argyris (1978), “the organization is an artifact of the individual ways of representing the organization” (p. 16). The organization is not seen as a static entity, but one that is constantly being “organized” through the actions of its members who continually attempting to know themselves as part of the organization. In this, the organization is reflexive. Organizational maps, shared descriptions which the members construct and embed in the governance of the organization, job descriptions, policies, etc., help direct member’s inquiry. Argyris equated these to orchestral scores, the media for organizational learning.

Organization learning is said to occur when members act as learning agents for the organization, observe the internal and external environment and take action to detect and correct any errors in the organizational theory in use. These observations take the form of inquiries. Individual images and organizational maps are modified (Argyris and Schön, 1978). The extent of modification is described in the levels of learning below.

**Systemic Levels of Learning**

Based on the work of Argyris and Schön (1975; Flood and Romm, 1996), four distinct levels of systemic learning have been identified: Zero, single, double, triple loop or deutero learning.

**Zero Loop Learning**

Zero loop learning occurs when an organization is faced with new problems or requirements but takes no corrective action (Bateson, 1973; Snell and Man-Kuen Chak, 1998).
Zero loop learning is exemplified in the response of P & O, Ltd., a large European ferry company, in the aftermath of the capsizing of the ferry, Herald of Free Enterprise, as it entered the English Channel in March, 1987 (Roux-Dufort, 2000). Over 200 persons died. P&O responded by assigning blame and removing the management team, but management failed to challenge its own assumptions about safety. The design flaw that contributed to the event was defended and no learning took place.

**Single Loop Learning**

Single loop learning is defined as the detection and correction of errors as measured against the organization’s current performance objectives or policies, with the goal of meeting the objectives or satisfying the policies (Lim and Chan, 2004). Single loop learning occurs when an organization encounters information or events that challenge its policies and practices, and the members of the organization take corrective action to maintain those policies. In this type of learning, the organization’s knowledge base is altered, and responses are designed to retain or preserve present policies, objectives, or cognitive framework (Snell and Man-Kuen Chan, 1998).

Argyris and Schön (1974) equate single loop learning in an organization to the action of a thermostat responding to information that its set point has been exceeded by turning on the heat or cooling equipment to restore conditions to the set point. The system acts to maintain equilibrium around its original governance. Performance objectives or policies act as governors, and behavior that does not track with these is considered “out of line” with the organization. Templeton (2000), defines this type of learning as incremental. Advances in MIS facilitated single loop learning by institutionalizing organizational memory through knowledge management systems (Templeton, 2000).
Behavior change is involved in single loop learning only to the extent that any aberrant behavior is identified and corrected to conform to company norms. Both positive and negative feedback are at work in single-loop learning since the system reinforces conformance and reduces error. Fiol and Lyles (1985) term this type of adjustment lower level learning, Mason (1993) calls it non-strategic learning, and Senge (1990) names it adaptive learning or coping. Single loop learning is a reactionary form and considered useful for routine operational functions within the organization.

Change, learning, and adaptation have been used interchangeably to describe the process of the organization adjusting to the environment. Hedberg (1981) argues that adaptation should not be equated with learning. Learning far exceeds simple adaptation that occurs without comprehension of cause and effect relationships.

Hedberg (1981) and Meyer (1982) refer to two types of organizational adaptation that do include some understanding of causal relationships: deviation reducing adaptation, and deviation amplifying adaptation. These forms, generally accepted in the literature, contribute to what Hedberg (1981) calls higher level and lower level learning. The levels give rise to the question: does the process of adjustment influence primarily the organization’s perception of events, or does it result in actual new behavior in response to the events. This study would require behavioral change to be considered learning.

Drawing again from the example of the sinking of the Herald of Free Enterprise to illustrate single loop learning, a commission of experts eventually convened to study the disaster. Several technical recommendations were made: more safety equipment, watertight compartments, (Roux-Dufort, 2000). These were socio-political changes, communicating broadly that corrective action had been taken. This response was compliant rather than reflective, and can be viewed as behavioral learning or adaptation, adjusting to the
environment in which organizational routines are modified to fit cues from the environment (Roux-Dufort, 2000). Reliance on previous experience still prevailed. Root causes were still hidden.

**Double loop learning**

Double loop learning occurs when existing norms are challenged or error is uncovered and the organization responds by altering its rules, policies and procedures (Argyris and Schön, 1978). Using the thermostat metaphor, in double loop learning, the thermostat would question how the set point had been determined and why. It would ask for the meaning of the set point. Open and unrestricted dialogue is needed for double loop learning to occur (Argyris and Schön, 1985). Clarity is also needed. Vagueness inhibits learning by masking the real conditions in the organizational environment. Double loop learning appears to facilitate adaptive learning by the organization (Argyris, 1996).

Double loop learning is required for more complex functions. Argyris and Shöen (1978) propose that, while single loop learning is habit re-enforcing, in order to achieve change or new behaviors, old behavior patterns must be altered. Double loop learning occurs when an organization is willing to challenge the meaning of its basic structures: mission, values, strategies, customers, and trade in old beliefs for new. Questioning assumptions leads to the potential for new behaviors and new constructs. Fiol and Lyles (1985) describes it as *higher-level learning*; Mason (1993) uses *strategic learning*; and Senge (1992) terms it *generative learning* in which the company’s capabilities expand.

Double-loop learning can also be applied at the level of the *individual* who challenges his or her own assumptions and approaches. There is general agreement, however, that organizational learning is not the sum of individual learning. Organizations are unique in that they develop and sustain learning systems that are both transmitted to its members and
absorbed into the organization as part of the organizational norms (Lawrence and Dyer, 1983; Martin, 1982, Mitroff and Kilmann, 1976.). Double loop learning increases the depth of the learning process.

In 1994, almost 10 years after the sinking of the Herald of Free Enterprise, the Estonia, another ferry, sank off the coast of Norway, killing over 800 passengers (Roux-Dufort, 2000). Had the ferry companies been able to confront and challenge previously held assumptions, abandoning old assumptions and values and replacing them with those more suited to the organization’s goals, new learning may have taken place and lives saved. However, this did not happen. Failure to learn from a crisis dooms it to repetition.

*Triple loop (deutero) learning*

Triple loop learning is required for the organization to move beyond the constraints of adaptation. Bateson (1973) called this *deutero-learning* meaning *second order learning* (Argyris and Schön, 1978); Flood and Romm (1996) labeled it *triple loop learning*. In triple loop learning, there is a shift in consciousness, creating linkage among the elements, restructuring the organization to respond to inputs. Templeton (2000) infers from Bateson (1973) that triple loop learning exists when the organization has coalesced into learning how to learn. However, the Flood and Romm (1996) definition, which describes a shift in identity as a result of relating organizational outcomes into a new role perception, expands the meaning and impact of triple loop learning. Deutero-learning describes a meta-learning process. The process of learning itself is examined through reflection on past experiences in both successful as well as failed learning (Argyris and Schön, 1978; Keegan and Turner, 2001). By scanning past experience, organizations learn what worked and what didn’t. The organization recognizes that it has learned new strategies and that learning is a way to deal with error correction. In this recognition, the organization realizes that learning, itself, is an
important and necessary approach to resolving issues and sets about creating learning strategies and practices. From this reflection, new learning strategies can be developed. In this sense, deuto learning is proactive toward improvement (Lim and Chan, 2004).

Theories of Action

Argyris bases his organization learning theory on action. Germaine to Argyris and Schön’s (1978) definition of organizational learning are organizational theories of action. It is the theories of action “that determine all deliberate human behavior” (Argyris and Schön, 1974, p. 4). Action theories are used by individuals and organizations to deal with others (Argyris and Kaplin, 1994). There are two: espoused theory and theory in use.

Espoused theories are expressed in official company policies and written philosophies, job descriptions and organizational charts. It is the organization’s official position. It represents the ideals the organization endeavors to uphold, its public face.

The second theory, theory in use, is often in conflict with the first, and is usually unspoken. It represents the way things are really done. It may be inferred from observing member’s behaviors. According to Argyris (1978), it may remain tacit because its deviance from the espoused theory is undiscussable. The organization covers its departure from its stated ideals.

It is the theory in use that usually defines the organization’s identity. The theory in use is embedded in organizational maps and images, and as changes occur through corrective behavior, the images and maps are changed. For organizational learning to occur, the changes must be embedded in organizational memory. “They must be encoded in the individual images and the shared maps of organizational theory in use from which individual members will subsequently act (Argyris and Schön, 1978, p. 19).”

Learning and Knowledge Framework
I have discussed some of the key concepts that are present in organizational learning theory and are at the foreground for this study. However, it is useful to have a framework for the theory, to gain perspective and to understand the distinction among related concepts.

The figure below shows the relationship among four important topics and places organizational learning within the context of the literature (Easterby-Smith and Lyles, 2005).

![Diagram](image)

*Figure 1.* Mapping of key topics in organizational learning and knowledge management.

Organizational Learning refers the “study of the learning processes of and within organizations, largely from the academic point of view” (Easterby-Smith and Lyles, 2005, p. 2). Organizational learning studies are undertaken to understand and assess critically what is occurring. The learning organization is seen as an ideal type that is capable of learning and using knowledge to advantage. Those who study learning organizations are doing so to understand how to improve capacity (Easterby-Smith and Lyles, 2005). Those studying organizational knowledge have a philosophical perspective and try to understand knowledge held within an organization, considering the differences between individual and group held

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knowledge. Knowledge management has a more technical grounding and looks at ways to more effectively disseminate and use knowledge to achieve improved organizational performance. (Easterby-Smith and Lyles, 2005)

The following section considers knowledge management, related to organizational learning (Vera and Crossan, 2005), in more detail.

Knowledge Management and Knowledge Acquisition

Organizational learning involves the occurrence of both cognitive and behavioral change that is “institutionalized and embedded in non-human repositories such as routines, systems, structures, culture and strategy” (Vera and Crossan, 2005, p. 123). Organizational learning has as its focus the process of change; knowledge management suggests how the organization should manage the knowledge represented in change. Knowledge is stored and becomes part of the organizational infrastructure (Vera and Crossan, 2005). In general, there is an organizational learning/knowledge management cycle: as the organization learns, new knowledge is stored in the organizational repositories and used as a platform for future organizational learning. Researchers studying organizational learning and knowledge acquisition, creation and development are likely to be looking at the same phenomenon from differing perspectives (Vera and Crossan, 2005).

Knowledge Management as a concept is heavily weighted in the direction of Information Technology. It provides the tools and technology to capture organizational learning. Knowledge management is defined as the “process of capturing the collective expertise and intelligence inside and outside an organization and using them to foster innovation through continued organizational learning” (Meso, Troutt, and Rudnicka, 2001, p. 3). There has been a general tension in recent years between the proponents of organizational learning theories and those of knowledge management (Easterby-Smith et al., 2000).
Knowledge Management has only recently emerged in the literature, while organizational learning has had a substantial presence since the 1980’s. Knowledge Management proponents who are critics of organizational learning claim it is too reliant on theories of individual learning that have been extended to organizational learning to be relevant (Easterby-Smith et al., 2000). Further, it is said that organizational learning overlooks knowledge creation. On the other side, criticism is leveled at knowledge management for diminishing the importance of action in favor of knowledge creation and its preoccupation with technology. The focal points of Knowledge Management are the technical aspects such as data base design and warehousing (Easterby-Smith et al., 2000). There is a current trend that attempts to reconcile the interests of both groups, merging the technical perspectives of KM with the more social constructs of organizational learning (Easterby-Smith et al., 2000).

Knowledge is understood in terms of its components: explicit knowledge and tacit knowledge.  

Explicit Knowledge

All “known knowledge” is explicit (Kikoski and Kikoski, 2004, p. 62). It is the most recognized and traditional form of knowledge. “Explicit knowledge is the only knowledge whose existence we recognize” (Kikoski and Kikoski, 2004, p. 62). It is our conscious knowledge, that which we can articulate. It is written, spoken, communicated and shared.

Tacit Knowledge

Tacit originates with the Latin word *tacere*, meaning “to be silent.” It is that which we know but is not verbalized. It is understood, wordless. It remains personal and private – possessed by all – but usually unrecognized (Kikoski and Kikoski, 2004). It is intuitive, reflecting physical, emotional and intellectual understanding.

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5 There is a third type, procedural knowledge, that is defined as “knowing how” without articulation (Matsuo, M. & Kusumi, T (2002)).
Tacit knowledge is widely accepted as the basis for expertise (Gourlay, 2004). Experience is at the base of tacit knowledge. Tacit knowledge is considered a key resource in organizational learning. Explicit knowledge is knowable by all, including the competition; therefore, since it is accessible by all, it does not constitute distinctive or competitive advantage. Tacit knowledge, however, is unique and holds the key to competitive advantage. However, in organizations, acquiring tacit knowledge may be difficult to evaluate (Argote, 1999). Tacit knowledge is often revealed in stories (Gourlay, 2004) which were solicited and mined in this study to enhance meaning.

Acquiring and processing information are key elements of organizational learning (Lines, 2004). Lines (2004) indicates that knowledge acquired can remain latent and in disuse for several years until the existence of a new situation requires that it be called forth. In the garbage can model, solutions arise only in the presence of a problem that matches the solution. (Cohen, March, and Olsen, 1973) Performance arising from organizational learning could be delayed in its manifestation.

**Acquisition of Knowledge in Groups**

Knowledge management facilitates sharing knowledge across groups. Argote (1999) describes group learning as process by which group affiliates can “acquire, share, and combine knowledge into a collective product through experience with one another” (p. 100). Theories of knowledge acquisition occurring in group learning have relevance for this study as much of the Y2K work was performed in teams. New knowledge is acquired in groups, either by exposing currently held knowledge from group members and sharing it within the group, or introducing knowledge from outside the group, and transporting information across groups (Argote, 1999; Zellmer-Bruhn, 2003). In order to share knowledge, individuals within the group must be willing and motivated to do so.

“The finding that participation has a positive impact on learning, here defined as the development and dissemination of work-based knowledge that is perceived as being useful for solving organizational problems, might provide a bridge between participation and performance. Learning that is thus defined concerns knowledge that is developed and distributed during the execution of work-based processes.”

The advantages of shared knowledge can be seen in the example of Dout Ivestor, CEO of Coca Cola (Morris, 1998). Using data to drive strategy, Ivestor condensed the time required to collect data from Coke’s global businesses from two and a half months to under five days, facilitating an instant response from Coke to changes in customers’ tastes and preferences and competitors’ moves (Morris, 1998).

Creating new knowledge as a result of the synergy of group members is known as “emergent” knowledge (Argote, 1999). New ideas can emerge from brainstorming or group discussion. This type of knowledge is especially important for situations in which innovation or creativity is desired (Argote, 1999).

In terms of group composition, homogeneous groups tend to learn and perform better than heterogeneous groups although heterogeneous groups may be more innovative. Using heterogeneous groups may be indicated when the need is for creativity and innovation; homogenous groups may best be used for tasks requiring high levels of coordination (Argote, 1999). Heterogeneous groups have been shown to excel in creating new knowledge (Argote, 1999).

Zellner-Bruhn (2003) conducted an interesting study examining the effects of interruptions, the disruption of the routine flow of work, on team knowledge acquisition. She found that interruptions did impact knowledge acquisition by stimulating the effort to perform knowledge transfer, and knowledge transfer promotes the achievement of new practices.
(Zellner-Bruhn, 2003). Her findings support prior research that infers “interruptions trigger active cognitive processing, which, in turn, stimulates changes such as acquiring new routines” (Zellner-Bruhn, 2003, p. 524.) She suggests that the interruption causes a break or gap that may be sufficient for teams to observe or discern new knowledge. Knowledge Management might focus on the timing of knowledge acquisition, e.g. at the time of or subsequent to interruptions (Zellner-Bruhn, 2003). Zellner-Bruhn’s (2003) work may have relevance to this study with regard to the disruptive quality of large scale events and potential stimulation for knowledge transfer and knowledge acquisition.

Currently there is a trend to integrate organizational learning and knowledge management on the assertion that “learning and knowledge are intertwined in an iterative, mutually reinforcing process. While learning (the process) produces new knowledge (the content), knowledge impacts future learning” (Vera and Crossan, 2005, p. 131). This thinking differentiates between learning content and learning processes.

Failure to Produce Learning

Roux-Dufort (2000) has written two compelling articles describing several catastrophic events in Europe – a plane crash and the capsizing of two ferry boats - and how organizations involved in the tragedies failed to learn from the experience. His thesis is that managers and scholars respond to crises paradoxically. Both recognize the presence of unique opportunities for important organization change in crisis events; however, they believe that the event is singular, and therefore not an appropriate vehicle for the effort of introspection and internal examination necessary to reformulate organizational assumptions. This view is supported by Starbuck and Milliken (1988) and Weick (1988, 1993), specifically relating to event fixation and cognitive narrowing. Instead of challenging the organizational paradigm,
organizations’ attempt to ‘normalize’, returning to previously held “cognitive, emotional and socio-political norms” to restore control and manage the situation “ (p. 28). Roux-Dufort (2000) takes his ferry disaster events through Argyris’ levels of learning to show how the responsible organizations failed to react.

Smith and Elliot (2007) also discuss the mounting support for the belief that organizations resist learning in the face of crisis (Toft and Reynolds, 1997). Their work constrasts with the earlier work of Turner (1976, 1978) who assumes that organizational learning results from crises and concludes that the norms and beliefs of the organization are challenged by the crisis and the aftermath is a “full cultural readjustment” to the newly formed world view. Smith and Elliot claim this rarely occurs.

Smith and Elliot identify three forms of organizational learning, reflecting Argyris and Schön’s single and double loop learning (first and second order learning, in Smith and Elliot’s argot): learning for crisis, learning as crisis, and learning from crisis. These forms are grounded in the definitions of crisis as an event or “phenomenon” (p. 522), and definition of learning as a “process” (p. 522). In learning for crises, the focus is achieving capacity for recovery. Since organizational structures are maintained, this is considered first order learning.

Learning as crisis may drive learning, artificially disrupting the status quo. “Crisis provides the opportunity to think the unthinkable…” (Smith and Elliot, 2007, p. 526). The rules of the game become ambiguous and beliefs are challenged. Here, learning may be seen as a crisis. Second order learning is possible.

Much of learning from crisis is superficial and occurs at the first order (single loop) level. Reflection and inquiry that follow crisis often lack depth and have an impact only at the technical and procedural levels. This assessment is in agreement with Roux-Dufort (2004). Organizations get “stuck” in first order learning because they do not challenge the manner in
which they learn (Argyris and Schöen, 1978). Smith and Elliot (2007) argue that the cause of barriers to learning from crisis arise from rigid core beliefs and inadequate communication. Poor communication results from making issues undiscussable (defensive routines), creating distortion (Argyris, 1999). They propose that organizations, recognizing that “all is not well with our current state of knowledge” (p. 533), may be able to challenge the organizational structures and move on to second order (double loop) learning, more successfully learning from crisis. Cultural change is need for learning to be sustained.

Fiol and Lyles (1985) present an alternate view of failure to learn, asserting that learning in an organization is influenced by four contextual factors: culture, strategy, structure and environment. These factors are reflexive in that they both create and are created by learning. Within the context of the environment, Fiol and Lyles (1985) conclude that an overload in either the internal or external environment, rendering it too complex for the organization to manage, will inhibit the occurrence of learning.

Higher order learning can result in negative or dysfunctional consequences such as resistance, manipulation, and avoidance (Fiol and Lyles, 1985). Negative behaviors may become entrenched and require shocks, jolts or crises to dislodge them from the organizational routine (Lawrence and Dyer, 1983; Meyer, 1982; Nystrom and Starbuck 1984).

Learning from Shocks in an Investment Environment

Using simulation, economists Moore and Schaller (2002) examined the results of permanent and transitory shocks on firms’ investments when the effects of learning were introduced into the model. The shocks considered were of two types: confirming shocks, those that tend to validate existing beliefs about the persistence of a certain level of interest, and challenging shocks, these that disconfirm prevalent beliefs about current interest levels. The
Learning introduced complexity into the response of firms in the simulation. Perception of the sequence of shocks (how firms interpreted the meaning of the events as they occurred sequentially) and the direction of those shocks relative to the firms’ beliefs became important. Investment in response to changes in interest rates varied depending on the past sequence or past history of shocks (Moore and Schaller, 2002). Further, a large transitory shock or several small shocks of the same direction can make the firm believe that a state change has occurred.

Shocks, or environmental changes, are ambiguous in their impact on organizations (Ford and Baucus, 1997; Pfeffer and Salancik, 1978). Therefore, as in Moore and Schaller’s (2002) interest rate simulation, organizational interpretation of environmental events becomes a key factor in determining future actions. Executives’ perceptions about events affect the course of the organization as executives formulate decisions based on those interpretations. Environmental changes tend to be labeled by executives as either threats or opportunities (Dutton and Jackson, 1987; Fredrickson, 1985; Jackson and Dutton, 1988). These interpretations have an effect on organizational actions (Dutton and Jackson, 1987; Thomas, Clark, and Gioia, 1993).

Current Debates

Easterby-Smith, et al. (2000), in their overview of the current status of organizational learning research, make these key points:
Organizational learning, with a history that dates back to the 1950’s, has been firmly established as a field of study.

Past debates have included:

1. Levels of learning – the individual, the group, and the organization as the focus of organizational learning. This study examines the process of learning and tracks learning over time.

2. Implications of cognitive and/or behavioral change. This study recognizes the need for both in establishing the occurrence of organizational learning.

3. Values of single loop and double loop learning. This study considers three systemic learning levels: single, double and triple loop learning. Emphasis is given to double and triple loop learning as these represent change in the organizational norms and identity.

4. Relationship between single and double loop learning. In this study, single loop learning is corrective or adaptive. Double loop learning requires reflection and inquiry and is shown in changed organizational norms and maps.

5. Distinctions between organizational learning and the learning organization. Organizational learning is descriptive. The learning organization is an ideal type and is descriptive.

These debates have essentially been resolved. They have seeded current controversies, and, while not abandoned, have become background to current discussions -- a stepping-off point for researchers to cover new ground, enabling new analyses (Easterby-Smith, et al., 2000).

Current and new debates include (Easterby-Smith, et al., 2000):

1. The nature and location of learning - Social constructionists hold that learning starts in conversations between individuals and is based on social interactions.
Learners are social beings who construct their understanding and learn form social interaction within socio-cultural and material settings. This study examines organizational learning in the context of interaction with the environment.

2. How is organizational learning best investigated – positivist versus interpretative approaches. The study seeks results through a qualitative interpretive approach.

3. Territorial disputes among various concepts - conflict between ideas of organizational learning and knowledge management. KM tends to focus on technology and omits social factors. This study holds that organizational learning is a separate but significantly related issue.

   Emergent issues that support this research include interest in new units of analysis, beyond the organization, and fostering a better understanding how learning takes place in the workplace. Also of interest is reconciliation with diversity – achieving collaboration; boundary crossing, boundary restructuring, and boundary relaxation.

   This study was undertaken as an opportunity to explore new approaches to the conduct of qualitative research, particularly with respect to defining the unit of analysis. Other efforts to address these controversies shall include a focus on the interaction effects of the various individuals and groups involved in the organization. We shall discuss this further in the analysis section.

Need for Empirical Research

Scholars agree that there has been a profusion of research intending to illumine the topic of organizational learning over the past 40 years (Lim and Chan, 2004, Argyris and Schön, 1975; Fiol and Lyles, 1885; Grinyer, 2000; Pedler, Boydell, and Burgoyne, 1989; Popper and Lipshitz, 2000; Tsang, 1997). These efforts have been designed to explain both
capacity to learn as well as speed of learning in order that organizations may enhance competitive advantage.

Fiol and Lyles (1985), arguing that there is no generally accepted, or universal model of organization learning, discuss several interesting dimensions of the concept. First is the need for organizations to align with their environment in order to ensure long-term survival. To achieve viability over time the organization must be able to learn, unlearn, and relearn (Chakravarthy 1982, Chandler, 1982, Cyert and March, 1963, Hambrick, 1983, Miller and Freissen, 1980). Chakravarthy (1982) states that organizational adaptation is key to strategic management as it represents the manner in which organizations meet the environment and continuously make strategic choices at times of change.

According to Miles (1982), organizations exercise choice at times of change. Since organizations have flexibility around selecting a response, learning can occur as they make choices and observe the consequences of those choices over time. Inquiry and reflection on outcomes aid in understanding the learning. Disruption can enhance the opportunity to learn (Zellmer-Bruhn, 2003). Performance can affect the ability to learn and assimilate from experience over time, and therefore, affect the organization’s learning and adaptation to a changing environment (Fiol and Lyles, 1985; March, Sproul and Tamuz, 1991). Literature on organizational impermanence supports the ability of temporary organizations to learn and retain continuity over time through interaction with a context of stable relationships (Ferriani, Corrado, and Boschetti, 2005). Ferriani et al. (2005) suggest that experimentation may increase in a context of a high degree of variation; further, that, by contrast, highly experienced [stable] teams can be unresponsive to variation (Levinthal and March, 1993; Levinthal and Rerup, 2004). Based on this, major events that may be both disruptive and
provide variation, should provide the most optimistic opportunity to discover whether or not learning has occurred.

**Public versus Private Organizations**

In concluding this section, there is an additional debate that requires recognition: that involving the relevance of organizational learning in public organizations. It is argued that the missions of the public and private sector differ. The primary responsibility of the private organization is to produce *financial returns* for its shareholders. Its qualities as a learning organization would enhance its ability to function in a highly competitive environment. Public organizations are said to address the *service* needs of its constituents. Some researchers question the benefit that public organizations would gain from embracing or developing learning organization qualities (Goh, 2001). Some stress the need for learning in both public and private sector organizations to address the rapidly changing environment, the effect of technological change (Ivergard and Berns, 2000).

This subject needs further elaboration. Some infer that organizational learning is relevant only for achieving enhanced competitive advantage. The assertion can be made that improved service delivery is an equally valid goal. This study assumes that organizational learning is important to the viability of any organization as an organic structure.

**Comments on Organizational Learning**

It is interesting to note that even in the most current publications, researchers comment that empirical work on organizational learning is meager and theoretical work dominates over empirical work, creating imbalance and a lack of substance in the foundations. Little has been done, empirically, to examine how learning occurs in natural work settings or
the impact of organizational context (Lines, 2004). In general, existing knowledge has not been integrated. Criticisms have been leveled against prescriptions for organizational learning without strong grounding in empirical research (Lines, 2004). Current research is still relying on the authority of classic publications more than decade and a half old: e.g. Cyert and March (1963), Huber (1991), DeGeus, (1988), Srivastava, (1983), Teese, (1990), as examples. However, as mentioned earlier, this reflects the relative newness as well as the consistency and stability in the field of inquiry.

Research Questions

Easterby-Smith et al. (2000) in their discussion of current issues and debates in organizational learning, call for increased empirical research and research that utilizes new research techniques. This study addresses both of those needs, adding empirical knowledge to the literature through the case study of the IS Division’s response to Y2K and the unique approach of examining learning as the unit of analysis.

Using the Y2K situation as context, questions are directed at understanding the organizational learning that occurred within the IS Division prior to, during and after this event. Questions focus on the work that occurred and participants’ understanding of the effects of that work on organizational learning. Most of my questions are framed as process questions to understand what and how things happened rather than variance questions that target quantity or response (Maxwell, 1996). The questions are particularizing in that they deal specifically with the responses in the IS Division. Maxwell (1996) asserts, “…the primary concern of the study is not with generalization but with developing adequate description, interpretation, and theory of [this] case” (p. 55).

Research questions may be summarized as follows:
A. What happened in the IS Division as it experienced a large scale event, specifically, Y2K?

B. Did learning occur within the IS Division in response to large scale events, specifically, Y2K? What was learned? What was the effect on the IS Division? How did learning occur? Was learning sustained? What is the influence of context on organizational learning, i.e., how do the properties of context interact to either aid or inhibit learning?

C. Can learning be employed effectively as a unit of analysis in this qualitative case study of the IS Division?
CHAPTER THREE

Methodology

Major Methodological Choices

Several decisions contributed to the design of this study. An early decision was made to approach this subject qualitatively. This approach was chosen to expose what happened during Y2K and to explore its potential as an organizational learning event.

Earliest writings on Y2K, those dated prior to 2000, focused on the technical aspects of Y2K and were directed at practitioners (Huang, Newell, and Pan et al., 2001). Ulrich and Hayes’ (1997) The Year 2000 Software Crisis, written to provide IT managers, business managers, software vendors, consultants and others with an in-depth understanding of the Y2K issues, is an example. “Non-technical issues, such as management of Y2K programs, have tended to be either ignored completely, or given very little attention… There are relatively few studies that report what lessons firms learnt or could learn from the process of organizing, preparing and testing their compliance” (Huang, et al., 2001, p. 162).

Many of the studies mentioning Y2K are written to expose the emerging importance of knowledge acquisition, knowledge integration and knowledge management (Leibowitz, 2001, Huang, et al., 2001). Generally, findings showed that organizations with a strategy to capture knowledge from technology were more successful than those that did not. Knowledge benefits occurred but organizations tended to be deficient in the process of capturing the knowledge to glean those benefits (Jennex, Olfman, and Addo, 2003). Other studies looked at the implementation of ERPs as a solution to Y2K (Soh, Kien, and Tay-Yap, 2000; Robey, Ross and Boudreau, 2000). Y2K remediation, with its cross-functional requirements, provided
a technical prototype for a growing number of EPR implementations. Further, knowledge integration was a key function for organizations engaging in global IT (Huang et al., 2001).

When the date change occurred without disruption, interest in Y2K faded and organizations shifted their attention to daily operational issues (Huang et al., 2001). Media changed focus to the “worthiness” of the Y2K investment in terms of time and money. Some considered Y2K a “false alarm” event. Huang, et al. attribute this neglect of the Y2K event to the “widespread belief that Y2K was an one-time event with no added value to an organization’s competitiveness” (p. 161). Post Y2K articles dealt with the impact of IT changes on the organization, Cannon and Woszcynski (2002) as an example. There are post Y2K articles with a collateral focus, e.g., the use of the internet as a communication tool in the event of crisis (DiNardo, 2002).

Learning occurs within the context in which it is applied; it is shaped by the context and it modifies the context. If we are to examine the potential carry-over of the learning from the Y2K experience to future events, then it is important to understand the contextual undergirding of the Y2K experience from the perspective of those who experienced it. 

Y2K had both technical and managerial implications and its impact held greater significance than fixing a date code.

Y2K events were examined as a time-ordered series. Each event was considered a mini-case and examined to understand it as the context for learning. The general approach was to ask, “What happened?” From the responses, the next step was to look at the event as described and determine what was important, i.e., what emerged as having significance based on interviewees’ reports? At times interviewees were explicit in their description. More often, significance had to be implied. The events provided context, but they were also a medium for expression. Interviewees interacted with the context to create outcomes. The interaction was
part of learning (March, et al., 1991). Change happened. Elements of the context changed. It is this that gives us grounds for exploring an organizational learning perspective.

Rival theories are considered in this study. An organizational learning approach is contrasted with a crisis management approach to understanding the impact of the events. While a comparison is not undertaken in depth, several points are made to justify adopting organizational learning as the preferred framework.

The major design decisions in this study are described below.

*The Research Design*

*Qualitative Research Approach*

Maxwell, (1996) whose work is a dominant influence on the structure of this study, cites five major reasons for conducting qualitative research: (1) to understand the meaning for those who are involved in the study, (2) to understand a specific context within which actions occur and the impact of the context on their actions, (3) to identify unanticipated phenomena and influences to generate grounded theories concerning them, (4) to gain an understanding of the processes by which events and actions occur, and (5) to develop causal explanations. *Meaning* arises from events, situations, and actions that involve the participants. Meaning involves not only responses to physical events, but also includes the sense that participants make of the events and how this sense-making affects their behavior. A study of context aids comprehension of how events, actions and meanings are fashioned by the unique situations in which they occur. Process is viewed distinctly from outcomes, and it is the strength of qualitative research to expose processes often missed by surveys. Miles and Huberman (1984) argued that
“much recent research supports a claim that we wish to make here: that field research is far better than solely quantified approaches at developing explanation of what we call local - the actual events and processes that led to specific outcomes” (p. 132).

*Case Study Method*

The case study method strengthens this research by creating broad description. It is appropriate for the study of a contemporary event that had not been extensively studied (Leonard-Barton, 1990). The case study captures the dynamics of the events under consideration.

Learning requires understanding the entire dynamic process, not just the outcome. As an example, decision-making is usually evaluated on the basis of the outcomes. However, before a decision is made and implemented, there are a number of “collateral consequences” (March, et al., 2002, p. 2) that are associated with making and putting the decision into action. Learning and evaluation occur in the process of having these experiences and prior to knowing the outcome of the decision. “When early collateral experiences are positive, organizations, like individuals, are prone to exhibit self-reinforcing decision behavior…Organizations repeat decisions simply because they have made them before” (March, et al., 2002, p. 2). Organizations learn from the processes, i.e. organizations learn from the actions they take, not just from the consequences (March, et al., 2002).

Leonard-Barton (1990) points out that the “phenomenon being researched always dictates to some extent the terms of its own dissection and exploration” (p. 249). The case study method allows both exploration and explanation, addressing questions of *what, how and why* (Yin, 1993, 2003). “[Y]ou would use the case study method because you deliberately want to uncover contextual conditions” (Yin, 2003, p. 13). The case study is appropriate for considering both a contemporary phenomena and the context within which it occurs,
particularly when the boundaries between the phenomena and the context are not distinct (Yin, 1993, 2003). The decision here to conduct a single case study reflected the desire to understand the phenomena in detail. Hatch (2002) and Merriam (1988) add that phenomena occur within specific boundaries, so the case study is a bounded system approach (Hatch, 2002). Also, the case study method supports the use of multiple sources of evidence (Yin, 1993, 2003). Lastly, the case study method is ideal for examining rival theories. (Yin, 1993, 2003) This research considers theories of crisis management relative to organizational learning theories (see Chapter 2 section titled Failure of Crisis Management to Produce Learning).

The case study can be used for exploration, description, and explanation within any of Yin’s five strategies: experiment, survey, archival analysis, history, case study (Yin, 2003). The choice should be guided by the research questions. “What “ questions are often best satisfied with a survey approach; “how” and “why” questions lend themselves to the case study (Yin, 2003). The purpose of this study was to explore the IS Division’s response to the large scale event of Y2K. It looked at “what” happened with individuals, groups and the organization within the context of Y2K? The belief that response to Y2K generated learning was explored through interview data, primarily retrospective reports, and observation within the scope of the study. Also, if learning did occur, how? What were the contributing factors? This part of the investigation considers cause and effect. Can factors that promote learning be identified?

*Interview Study*

This study relied heavily on interview data for its results. “Qualitative researchers utilize special interview strategies that are different in nature from interviews done in quantitative studies…Qualitative interviewers create a special kind of speech event during which they ask open ended questions, encourage informants to explain their unique
perspectives on the issues at hand, and listen intently for special language and other clues that reveal meaning structures informants use to understand their worlds” (Hatch, 2005, p. 23). In qualitative interviewing, the researcher approaches the interview situation with a general idea of questions to be asked, but creates questions as the interview proceeds based on the response of the interviewee, the social context, and the overall feeling of comfort with the interview (Hatch, 2005). “Qualitative interviews build on a naturalistic, interpretive philosophy, …are extensions of ordinary conversations,…and [consider] the interviewees [as] partners in the research enterprise rather than subjects to be tested or examined” (Rubin and Rubin, 2005, p. 12).

Constraints in interviewing

At the request of the IS Division, interviews were not recorded. Note-taking was permitted. This was a major constraint.

There were several other factors impinging on conducting interviews for the study. One constraint was the general attitude of the interviewees toward the topic of Y2K. Participants were polite, cooperative, and willing to talk, but they seemed puzzled that I would want to talk about Y2K., which they considered to be a non-event.

Time was another constraint. The IS Division was entering the implementation phase of a major ERP project, and employees’ time was restricted. I was always aware that I was interviewing within a limited timeframe and within limited accessibility.

However, the constraint that proved most difficult was a prohibition against taping the interviews. Knowing the context of the work from my prior experience helped me formulate questions. Transcribing my notes immediately after the interview was critical to gaining as much content as possible.

_A Retrospective Study to Support Identification of Patterns in Dynamic Processes_
This was an interview study that relied principally on recalled information from participants. There is in the literature a preponderance of evidence indicating that participants do tend to recall the key events of processes in which they participated (Huber and Power, 1985), although they may have not attributed importance to the events as they occurred (Leonard-Barton, 1990).

*Advantages of retrospective studies*  It is easier for the researcher to hold objectivity in retrospective studies (Leonard-Barton, 1990). Multiple retrospective studies can enhance the external validity of a design (Leonard-Barton, 1990).

*Constraints of retrospective studies*  Leonard-Barton (1990) cites the inability to assess cause and effect from reconstituted events as being one of the most significant constraints on wholly retrospective studies. Some constraints of retrospective studies can be exemplified by the disinclination of participants to reconstruct political issues (Leonard-Barton, 1990). There could also be some imprecision about the timing of events. Further, distinguishing important, relevant data among a profusion of data could present difficulties.

*Time Ordered Events*  
The original design of the study included examining two major sequential events to determine if the learning in one might have an impact on learning in the second. The second event chose was the attack of September 11, 2001 (911). However, as reported later, this did not prove to be a useful design for this study. The IS Division reported a negligible response to 911 and therefore data did not emerge. Dr. Albert framed the difference between Y2K and 911 this way:

“What happened in 911, rather than being considered an IT incident, was run as part of the Police responsibilities. Their concerns are life and safely issues. We were more involved around communication. [911] was more crisis management [and not our responsibility] than business contingency.”
Therefore, the study looked at the learning responses of the IS Division only to Y2K. Learning was examined to determine the “flow” over the designated time period. Information about responses occurring at the time of the events was collected as well as information about events that occurred in the periods between events. While extensive Y2K planning activity was not unexpected, some general preparation, activities that would be considered collateral experiences, could have occurred during these periods, e.g. enhancing security plan and purchasing new equipment (March, et al., 1991). We explored this.

Table 1 was constructed to show events as chronology. Columns are time sequenced, but rows indicating responses need not be ordered (Miles and Huberman, 1994).

Table 1  Time Chart for Chronology

<table>
<thead>
<tr>
<th>T1</th>
<th>T2</th>
<th>T3</th>
<th>T4</th>
<th>T5</th>
</tr>
</thead>
<tbody>
<tr>
<td>Preparation for Y2K 1998</td>
<td>Y2K event and immediately after 2000</td>
<td>Period between Y2K and next event</td>
<td>Next event</td>
<td>Next event…</td>
</tr>
</tbody>
</table>

*Multiple Sources of Evidence*

Interview data was collected from 15 employees who participated in the Y2K events within the IS Division. Archival data in the form of schedules, progress reports, administrative reports, consultant reports, committee reports and government documents were also examined to help establish time and duration and to help create context.

*Examination of Rival Theories*

The alternate theories under consideration were Crisis Management and Organizational Learning. It is important to consider these theories together because these events were described as crises and have been typically understood within the framework of
crisis management. By contrast, this study proposed that an organizational learning framework provides a more outcome based, comprehensive, a future directed perspective that is useful in helping organizations achieve goal-oriented behavior. An in-depth examination contrasting these theories will be reserved for future study.

Site Selection Strategy

Setting the case study within the IS Division of Kent State University was based in part on availability. It was a second choice of venue and adopted when the Cleveland Division of Water, the original site, withdrew its initial agreement to be involved. Cleveland’s decision may have been based on a discomfort with giving an outside person access to potentially sensitive data. Access to the IS Division was negotiated by the Dissertation Chair who knows the current IS Executive Director of Operations, Dr. Paul Albert. Dr. Albert had been a student in the M&IS section of the College of Business and was called to work in the IS Division to lead the IS remediation project. Two meetings were held with Dr. Albert to explain the needs of the project and a meeting was scheduled with Ed Mahan, the Division Vice President to gain final approval. This was achieved in the fall of 2005.

The first interview was scheduled on September 27, 2006. Interviews were held in the May 4th Room, a spacious, well-furnished conference room at the rear of the first floor of the Kent Campus Library. The room was filled with memorabilia and symbols of the May 4th incident in which four Kent students has been killed by the National Guard. Most of the interviewees responded to the comfort of the room. They were given a choice to sit at the large conference table or in the sofas and chairs. Most chose the table seating. I explained my need to take hand written notes and warned that at times I would slow down or ask for information to be repeated. I found this method of gathering information very difficult. However, interviewees were willing to respond. They both answered my questions as well as contributed
information. I was struck by two qualities of the participants. First, they had a positive attitude about the Division. Most were long term employees, a quality that was selected into the sample since they were part of the Y2K project in 1998-99. Also, they seemed to like working with each other.

Participants

Participants were selected from among those who are currently employed by the IS Division and who had participated in the Y2K project. The intent was to select employees across the Division to represent varied sections and organizational levels, balancing male and female, managers and analysts. I did not know any of the participants prior to interviewing.

Participants were provided with a written description and purpose of the study before they were contacted for an appointment. This explanation was repeated at the time of initiating the interview when participants were asked to sign a consent form. Confidentiality was assured. Participants received a copy of the consent form. The file copy is contained in the M&IS Office, Room 432A, College of Business Building.

The sample was purposeful in that I attempted to interview participants at all levels and through all sections to assure the presence of broad perspectives of the organization’s response to the events (Maxwell, 1996; Patton, 1990; Leonard-Barton, 1990). Based on her experience with longitudinal and retrospective studies, Leonard-Barton (1990) recommends interviewing participants in “comparable organizational positions and roles” (p. 262). The entire organization was involved in the critical events; it was one of the criteria for choosing the events: they had organization-wide impact. The table below represents the spread of participants across the organization.
Table 2 Distribution of Participants

<table>
<thead>
<tr>
<th></th>
<th>EXECUTIVE DIRECTOR (1)</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>Application Development</td>
</tr>
<tr>
<td>Manager</td>
<td>2</td>
</tr>
<tr>
<td>Analyst</td>
<td>2</td>
</tr>
</tbody>
</table>

There were six female and nine male participants.

*Design Change: Variable Removed*

The original research design included the study of responses to 911 as an additional event. However, the data from inquiries about 911 were not sufficient to draw any conclusions. The poor results from 911 weakened the study. Therefore a decision was made to remove 911 as a variable from the study. The media linked 911 with Y2K, labeling 911 as the Y2K that never happened, and in a different case study, it may have relevance. Many organizations pulled out the contingency plans prepared for Y2K and put them to use in 911. Also, it seemed important in the design to include in the study at least two large scale events for contrast. This assumption proved not to be true. The learning that occurred as a result of Y2K could be tracked over time without including 911 as a factor. No incident of learning occurred as a result of Y2K that was relevant to the events of 911 within the IS Division. In tracking learning over time, the significant relationships and interactions were between the Y2K incidents of learning and other projects, rather than external events such as 911. Therefore, the removal of Y2K as a variable did not have an impact on the ability to track learning or on the understanding of the incidents of learning as units of analysis.

While the results were modest, it appears that some learning did occur in the response to 911, and that the learning has been sustained through the present. Specifically, there is some
evidence that the IS Division moved to a heightened awareness concerning security issues and undertook efforts to increase security through a business continuity and disaster recovery plan.

Most interviewees reported that their work was unaffected by 911. This is reflected in the following statements: “911 had no impact on Help Desk,” “The increase in security had no impact of me,” “There was not real impact.” Because of this lack of specific response, I felt best to remove the variable.

Data Collection

Most participants were interviewed once. The interviews ranged from 45 minutes to one and one-half hours, but most were about an hour. The times and locations were noted on the interview sheets. Dr. Albert was interviewed at least three times and several clarifying emails were exchanged. Emails were also exchanged with three other managers. Each interview and email exchange was recorded and coded separately.

Case Study Database

Yin (1994) recommends that, in principle, every research project using a case study methodology should create a database – as a central repository and as an official resource which can be accessed by other inquirers to review data directly. The database constructed for this research included four sections:

a. Interview records filed by participant
   1. Notes from interviews,
   2. transcriptions of interviews,
   3. coded interviews

b. Dissertation correspondence filed by date
   1. letters
   2. emails
3. other correspondence related to this study

c. Archived materials utilized in this study, correspondences, approvals, consent forms are retained in a section called case study documents and filed by type.

d. Consent forms are kept in my personnel file in the M&IS office, Room 432, College of Business

Data Collection Strategies

Two types of data collection strategies were employed:

a. Open interviews – participants were asked to recount their roles in each of the events, describe their understanding of the events. Participants were encouraged to reflect on any learning that may have occurred as the organization responded to the events. Did they encounter new experiences? Were different things required of them? Did they know how to perform the tasks that were being required of them?

b. Review of records – obtaining reports, records from archives. I received some reports that were filed during the Y2K project. Others are available in the Division archives.

Interviews were largely unstructured (Leonard-Barton, 1990; Reissman, 1991). However, as guidance, a pool of interview questions was used to stimulate the participant’s response. In each interview, I tried to ascertain the participant’s position and role at the time of Y2K. I asked them to tell me about their experience with each event. Who did they work with? Did they work with persons who were new to them? Did they work with persons from other departments? Did they work with persons who came from outside the university? What dependencies were uncovered? How was the organization connected internally and externally to other organizations - locally, nationally, internationally – during these events? How did participants respond to the formation of groups composed of workers who had not worked
together before? What were the effects and meaning of participation? How was communication managed? Was training provided? How did participants learn to perform new tasks?

Y2K participants were asked about their reaction to the event. They were also asked about what happened in the Division as a result of this event.

Participants were asked to recount memorable stories that illustrate the meaning of the events for them, but none were forthcoming.

Data Analysis

Data Analysis is seeking meaning:

"Data analysis means organizing and interrogating data in ways that allow researchers to see patterns, identify themes, discover relationships, develop explanations, make interpretations, mount critiques, or generate theories. It involves synthesis, evaluation, interpretation, categorization, hypothesizing, comparison, and pattern finding" (Hatch, 2002, p. 148).

The recommendation for early structured data analysis, immediately after the interviews were complete, was followed in this study (Hatch, 2002, Bogdan and Biklen, 1992; Gleane and Peshkin, 1992; Spradley, 1979, 1980). This allowed actual findings to influence the direction of future data collection.

Hatch (2002) describes an inductive approach which he claims is characteristic of all qualitative research. Inductive analysis progresses from the specific to the general, i.e., “to begin with the particular pieces of evidence, then pull them together into a meaningful whole” (Hatch, 2002, p. 161). In an attempt to create templates for new researchers struggling with how to achieve meaningful of data analysis, Hatch (2002) defines five models for data analysis: typological, inductive, interpretative, political, and polyvocal. These models may be adapted to fit individual project needs. This research followed inductive analysis.
The selection priorities as analytic context for addressing data analysis in this study are based on the unit of analysis and the research questions. These priorities are described below:

1. The highest priority was assigned to analyzing data that describes the process of learning and creating a learning time line. (It may be assumed that some learning took place, in that learning is always occurring.) This analysis is complex due to the interactivity among the elements and the event context. Questions would include what kind of learning took place, and how can we to begin to track the process through the time period studied? Priority would also be given to data that relate to or illuminate categories of current debate (Easterby-Smith, et al., 2000).

2. Theory development provides a blueprint for the study and acts to provide guidance for selecting the data to be collected (Yin, 2003). Published works can provide a theoretical framework for a specific case study design. This case study is informed by the organizational learning theories of Argyris and Schön. Yin contrasts the theoretical study with descriptive study in which the focus is on the purpose of the descriptive endeavor, the range of topics that might be considered, and the focal point or specific topic(s) of the description. This research falls within Yin’s (2003) framework for theoretical rather than descriptive structure. Following the work of Argyris, this research goes beyond description.

The two main strategies for data analysis are: (1) Chronology as a key to understanding the unit of analysis, i.e., learning over time; and (2) Hatch’s (2002) inductive analysis. Maxwell’s (1996) contextualizing strategies are also applied to analyzing the results. Coding and categorizing were generally applied to interview data.

*Chronology*
Data from interviews describing any events that fit either the outcomes-based or cognitive-based definitions of learning were categorized and assigned appropriate areas in a time-table by year. These categories were arranged across the table by time sequence. Once the events were assigned, they were placed in context and the characteristics of the context examined. Analysis includes both the incident of learning, as well as the context – the placement of events – within the activities surrounding the learning event. This is the analysis of both content and context, akin to understanding both the direction of the stream as well as the surrounding landscape. Yin’s (1994) chronology was utilized.

**Inductive Analysis**

Data analysis was an iterative process designed to identify themes across participant’s responses. All interview data was subjected to inductive analysis and based on Hatch’s (2002) model for inductive analysis. The analysis followed this protocol:

a. Interview notes were transcribed immediately after each interview

b. Interview notes were then reviewed for accuracy in transcription.

c. Interview notes were copied into a chart with three columns for analysis; the first contained the raw transcription. The second contained specific quotes, lines of data that were selected as being significantly related to the research questions or of general interest

d. The selected quotes were descriptively coded as categories in the third column.

e. Categories were subjected to multiple reviews and revisions

f. Categories were collected and summarized as themes when appropriate.

g. Categories or themes were collected and clustered as results

h. An outline was generated from the results
Maxwell’s (1996) contextualizing strategies endeavor to understand meaning of data within its context. This differs from categorizing, breaking the data down into specific elements and attempts to reconstitute it as categories. Contextualizing strategies examine the relationships among the elements, not looking for similarities, but linkage, among the elements and the elements with the context. (Maxwell, 1996) Categorizing and contextualizing work well in combination to both build theory (categorizing) and as a tool to better understand individuals and situations (contextualizing)” (Maxwell, 1996, p. 79). Questions of linkage or interactivity cannot be answered by categorization. Questions of likeness and difference cannot be addressed using contextualization (Maxwell, 1996). The questions and analytic approach must match.

Hatch (2002) comments on the importance of data that may not appear frequently in the data set, but that provides important information about the situation under investigation. The data could be deemed powerful “because they make a strong case without appearing frequently” (Hatch, 2002, p. 170). Data can be significant when it connects other data or provides explanation of concept that is core to the study. Frequency of mention was not the only criteria for including data in the results. Descriptive significance was important in determining inclusion.

**Validity**

Maxwell (1996) describes validity as “correctness or credibility of a description, conclusion, explanation, interpretation, or other sort of account (p. 87).” Validity is conditional and “depends on the relationship of your conclusions to the real world” (Maxwell, 1996, p. 86). It is relative, not context independent, and must be evaluated in terms of the intent of the research and the conditions of the research; it is based on the evidence of the research and not the methods.
Much of the conventional perspective on validity derives from Campbell and Stanley’s work in the early 1960’s (Eisenhart and Howe, 1992). Lincoln and Guba (1984) present an alternative approach to the traditional quantitative requirements for validity that better serve the intent of naturalistic inquiries; they suggest methods that surpass those achieved from traditional “rigor.” They explore the concept of validity as trustworthiness, i.e. the need of the researcher to convince the listeners that the results are worthy of attention.

Substitute concepts proposed by Lincoln and Guba (1994):

1. **Credibility** replaces internal validity. Credibility is achieving agreement by the participants that the many realities constructed as findings in the research are correct.

2. **Applicability** (Lincoln and Guba, 1984) is the alternative concept to external validity. Generalizibility is problematic for this reason: all that is known in quantitative studies is the research context; it is not possible to know about those situations into which transfer may occur. In qualitative research, responsibility to determine if contexts are similar and appropriate for transfer shifts from the researcher to the one who seeks transferability. Further the threats articulated by LeCompte and Goetz (1982), selection effects, setting effects, unique historical experience, and construct effects are not problematic for the naturalistic researcher; rather they are expected and taken into account as part of the design.

3. **Consistency and dependability** replace reliability (Lincoln and Guba, 1984). This is achieved by accounting for volatility and changes that occur because of the design.

4. **Neutrality** replaces objectivity. Neutrality refers to the ability to confirm the data, not the researcher’s characteristic of objectivity.
These concepts were considered early in this case study:

**Credibility**

Credibility was achieved through dialogues with interviewees concerning the content of the interviews. The interviews were retrospective accounts of events during Y2K. Information was frequently checked with administration. At no time was checked information reversed. This area could have been strengthened with follow up interviews. E-mails were used as follow-up in some cases.

**Applicability**

This is a case study of a single setting using a purposeful sample and as such, not appropriate for claims about generalizibility (Maxwell, 1996). Maxwell does describe what “Judith Singer (personal communication) has called face generalizibility” (p. 97), the belief that there is no reason to doubt the results can be more generally applied. The ability to generalize findings from this study is enhanced by the universality of Y2K. All organizations faced the same Y2K issues, processing the millennium date. The methodology employed contained the same elements. The variance among organizations was contextual. Specific learning emerged from the unique factors that characterize each organization. Maxwell further states that in qualitative studies, generalizibility can be founded, not on sampling of a particular population to which results can be applied, but on the theory development which can then be expanded to other cases (Maxwell, 1996, Yin, 1994).

**Consistency and dependability**

This is a retrospective study. The high level consistency among interviewees in describing the events was evident. Information was internally consistent, that is, interviewees

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6 Y2K Methodology was tied to the legal defense of doing “due diligence.” The methodology required awareness, planning and budgeting; inventory and assessment; remediation; validation and testing (1999). Some organizations added independent validation and verification.
agreed with themselves; they also agreed with each other about the nature of past events.

Consistency held through follow-on interviews.

Table 3  Methods for Establishing Validity

<table>
<thead>
<tr>
<th>METHOD</th>
<th>ACTIVITY</th>
<th>IMPACT</th>
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<tbody>
<tr>
<td>1. Triangulation</td>
<td>1. Three organizational levels were interviewed: executive, managerial, and analyst.</td>
<td>1. Consistency among internal reports was high.</td>
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<tr>
<td></td>
<td>2. Documents, reports, schedules were provided that described activities carried out by the IS Division within the university effort to achieve Y2K compliance.</td>
<td>2. There was agreement between projects in Cleveland Department of Public Utilities and the Kent IS Division concerning process.</td>
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<tr>
<td></td>
<td>3. My own experience with Y2K in Cleveland and affiliation with national interests.</td>
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</table>
| 2. Two levels of analysis | 1. Chronology  
2. Inductive Approach                                                                 |                                                                        |
| 3. Peer debriefing   | 3. Uninvolved peers who commented on this study include: my dissertation committee, professional colleagues who also led Y2K projects, one in Cleveland, one in Pennsylvania |                                                                        |
1. Triangulation

Triangulation was achieved through interviewing several levels of the organization and referral to archived documents, national and international accounts, and my own experience (Yin, 2003).

   a. Three organizational levels were interviewed: executive, managerial, and analyst. These levels agreed in their accounts of how events were responded to within the IS Division. Dr. Albert (personal communication) reviewed information and provided additional detail, but did not contradict any of the staff accounts, pointing to general agreement among participants regarding what happened.

   b. Several documents, reports, schedules were provided that described activities carried out by the IS Division within the university effort to achieve Y2K compliance. These were used as a source of additional information and clarification.

   c. My own experience with Y2K in Cleveland. The basic methodologies to achieve compliance were repeated for all organizations. I had a deep understanding of the experience from having participated, and this became a frame of reference for questioning.

The challenge in getting information was that the participants did not see the events as important. They were willing to talk but did not offer information because they did not see it as significant. Therefore, they did not always offer information. Prompting was often required to elicit information.

2. Levels of Analysis
Information was analyzed in terms of themes. It was further analyzed as a Chronology (Yin, 2003). This provided two perspectives for interpreting results.

3. Peer Debriefing

Guidance was sought from my dissertation chair and methodology advisor. I also consulted two professional colleagues who led Y2K projects in Ohio and in Pennsylvania, who were very helpful in adding layers of understanding to the Y2K event. Dr. Albert was both informant and advisor and provided clarification for responses when needed.

Generalization:

Yin (2003) discusses the difference between statistical generalization and analytic generalization. The former describes inferences that can be made about a larger, more universal population from a smaller subset of that population. Statistical generalization is often used in survey work. Analytic generalization, “in which a previously developed theory is used as a template with which to compare the empirical results of the study” (Yin, 2003, p. 32-33), is more appropriate for this study.

Summary

This is a qualitative case study of learning as an organizational response to the Y2K event within the Kent State University Information Services Division based on retrospective interview data. The original intent was to include September 11, 2001 as an additional large scale event but the data proved insufficient for analysis. Data was collected from 15 employees currently employed within in the Division who participated in the Y2K project. Relevant Division records were also reviewed. The research considered the effects of a crisis management versus an organizational learning approach. Data was analyzed using chronology and inductive or thematic analysis. Validity was achieved through triangulation, using two levels of analysis, and peer debriefing.
Lincoln and Guba’s substitute concepts of credibility, applicability, consistency and dependability, and neutrality were applied to further assure validity in the findings.
CHAPTER FOUR

Results

Themes in Y2K Results

This chapter relates the story of Y2K in the IS Division from 1998 through 2000. Information was obtained from interviews and artifacts to create context. Each heading listed describes one of the themes that emerged as interviewees told their Y2K stories. The themes of hype, expectations and defining success; relationship and trust; and reflection and standardization tells us what was learned and what was not. A cluster of themes relating to the importance of the role of Human Resource Management (HRM) in Y2K emerged as an important result in the data. For clarity, these themes were organized around Kleimann’s model of the employment lifecycle. A separate section is being devoted to a description of the HRM related results.

One important HR related result was an increase in compensation for IT workers. It helped seal the success of the remediation work. The effectiveness of learning as a unit of analysis can be seen in the chronology. However, the chronology shows learning as a linear progression, and the study found further evidence that that learning is dynamic, and in studying learning as a unit of analysis, this multidimensional quality needs to be taken into account.

IS Division in 1998-99

In 1999, when the Y2K Project moved into full implementation, the Division was operating under a strain. It had not seen a budget increase in seven years -- the equivalent of a declining budget -- and its workload was expanding. (Blythe and Nogy, 1999). By contrast,
information technology was growing in the US economy and growing in most corporate and institutional budgets. The IS Division had been meeting its expanding responsibilities by shifting resources from administrative information services such as Applications Development to areas such as Network and Client Services. Morale was low in Applications Development and turnover was high. Highly anticipated work to develop web applications for registration and class schedules and development of a data warehouse had been cancelled.

At the time of Y2K, IS was a Division of the Department of Finance, responsible for telecommunications and installing, implementing and maintaining hardware and software applications across campus. Organizationally, the IS Division was structured into three sections: Applications Development, Systems Support and Client Services representing 38 managers and analysts, overseeing the computer labs, Help Desk, desk top support, engineering and operations, Data Centers, telephones, Educational Technology and distance learning. Networking was a separate section within the Division. The IS Division grew through experience both in servicing and supporting hardware and software as the number of applications and PCs requested across the University increased. During the 1990s, the period preceding Y2K, the IS structure remained largely stable. However, this changed with its rapid growth after 2000.

The IS Division workload has fluctuated over time. It was handling about 300 active projects in 2002. Budgetary restrictions resulted in management practices that prioritized and screened projects with a consequential reduction in number. This intense workload contributed to the Division being described as “task-oriented.”

The days of IS personnel were filled with both planned and unplanned assignments. It was not unusual for a staffer to be snagged on daily rounds to respond to an impromptu request for service. The origins of assignments were about equally split: 50% coming from
clients and 50% administratively assigned. Staffers claim that about 10-20% of their time is needed just for new assignments.

Preliminary planning for Y2K began in 1998. The Division was facing a complex remediation process. The problem was rooted in the early management of the Student Information System (SIS). Purchased from SCT Corporation in February, 1996 and installed in March, 1996, SIS was not providing the Departments of Financial Aid and the Bursar with needed functionality. The immediate solution adopted by the IS Division was to create modifications to the system (Blythe and Abbot, 1999). Most modifications were installed to support the policies of the university.

The university had an established a relationship with SCT, (now Sungard, a provider of software programs for higher education administrative applications). The University paid SCT a yearly fee to keep the product up to date through regular upgrades. As the internal SIS modifications increased, the SCT upgrades were shelved.

When faced with the need to make Y2K corrections in 1998, IS Administration had decided to upgrade SIS independent of SCT, enlisting, instead, the help of CAP Gemini, a French consulting company that set up offices to provide Y2K services across the US. The initial approach was cumbersome. The code from the University system was sent out for correction to the Consultant, CAP Gemini. At the same time changes were coming in from SCT, the original software vendor. Local programming staff could not keep up with the changes. They were caught in crosscurrents of code going out to the consultant to be updated and changes coming in from both the consultant and SCT, the vendor. This proved to be the source of much confusion in addressing Y2K date problems.

General guidelines recommend that Y2K project management not be assigned to outside consultants (Ulrich and Hayes, 1997). Consultants bring their own point of view and
lack the in-depth organizational knowledge required to broadly manage the Y2K project. There are some project management tasks that consultants lack the authority to perform: contract reviews and purchasing revisions, as examples. Finally, ultimate responsibility is assigned to the organization’s top management and cannot be delegated.

Because of the difficulties, Dr. Albert, then a Ph.D. candidate in the College of Business and systems expert, was brought in to take over the Y2K project in April, 1999. He questioned why the Division was not using the vendor supplied changes which would have provided a Y2K compliant version of the Student Information System. No one could provide a direct answer. So he decided to apply the vendor (SCT) changes. He immediately severed the relationship with the consultant and put the project back on track by implementing the Y2K changes with SCT exclusively.

Many of those interviewed credit Dr. Albert with getting the project back on track. Most interviewed agreed that Y2K success dates from Dr. Albert’s arrival. Although the work was undertaken by teams, Dr. Albert is mentioned as the major driver of the remediation work. “Paul was the team leader.” “Paul was very organized, very easy, methodical and patient. He does not get excited. This led to a calm environment… Plus, he had so much knowledge of the organization. He knows what everyone is supposed to do and he is very approachable. He always has an answer and he won’t forget about you.” Another said, “Paul’s arrival was a major step forward.”

Scope of the Project

Y2K had an impact on the university as a whole, “from desktop PCs and equipment. The effect went far beyond IT.” Dr. Albert redefined the scope of the project when he took over its management in April, 1999, discontinuing the complex correction of program modifications. “We identified all the different types of hardware and software in use in the
university, everything from Gateway PCs to some esoteric chemistry analyzers. We included both coding and embedded systems, both hardware and software. A general, wide in scope, inventory.”

According to Margaret Wheatley (1999), “When complex systems fail, old patterns of thinking and managing simply don’t work” (p. 1). She predicts that the type of potential failure signified by Y2K will continue through the 21st century, and we need to be prepared by learning what we can from it. Management of system complexity required teams that worked concurrently on different levels of the problem to create a solution.

Goals of Y2K Project

The goals of the Y2K Project within the University, articulated by one manager, were:

1. No system downtime; no data loss
2. Classes remain up and running
3. No loss of service.

These goals were summarized as “Avert disaster.”

The achievement of success for Y2K, as one manager defined it in our interview, was “no negative impact.” This definition implies that when all have done their work satisfactorily, there would be no change. No event. Nothing would happen. Unless the success criteria were clearly re-defined, so that maintaining the current condition becomes a positive outcome, this definition of success could negatively affect the perception and response of the employees to their own achievement. In fact, this happened. Although labor was invested, it appeared that nothing was achieved. This was an important observation and will be discussed with the work of Robert Fritz in the next section.

Robert Fritz (1989), in The Path of Least Resistance, describes a cycle of creativity. The stages include germination, assimilation and completion. “In the creative process, acknowledging the steps you have taken toward your goal is an important act of completion”
Fritz (1989, p. 247). Acknowledging the results that have been created confirms the fact you have reached the stage of completion. Neglecting this step, as may happen in a reactive orientation, can lead to believing that the outcome happened by good luck and to the desired outcome having little meaning. This judgment of no meaning can retard future creativity.

Fritz (1989) states that there is an energy released at completion that drives future actions, a new creative cycle. Completion begets another cycle of creation. Successful completion becomes a springboard for the next undertaking. In deuto (triple loop) learning, the process of creation has been successfully learned, and that learning has become an ongoing series of creative acts.

Acknowledging the steps that have been completed in the final stages of the creative cycle is an act of reflection. This reflection provides the opportunity to learn, to ask questions (make inquiries) about what could have been done differently to improve the process? What else could this process be applied to -- a generative link. The energy from completion and the benefit of reflection can lead to new creations, or in the case of the firm, innovation.

_Immovable Deadline_

The immovable deadline of December 31, 2000 defined Y2K. The goal was achieving compliance before the date change. There was no reprieve, no extension, no flexibility. The deadline stood like an elephant in the sand. It could not be covered up. Dr. Albert reflects, “Because that Big Deadline was just sitting there, the companies had to do something. It was immovable, and there just wasn’t anything you could do. This had practical implications for the project in that, “Once you got into the project, you had to be careful about due dates. Nothing could slip.” Nandan Nilekani, the co-chairman of Infosys Technologies, one of India’s premier outsourcing companies, states, “What did Y2K do? It was a deadline imposed
by the calendar, and therefore it had a huge ability to concentrate the mind. It became a drop-dead date for everyone. (Freidman, 2007)

According to one manager, “There was a deadline that could not be moved, and we had to deal with it…The immovable deadline caused focus.” IS Division employees accepted this deadline and responded by cooperating. “No one was disgruntled. There was no backlash. No one complained. Everyone was very cooperative.” The tight focus was supported by management. “We had good management and they had confidence in us. We were helpful with other people and we reassured others that everything would be alright.” Facing the Y2K deadline was like telling the truth.

**Hype, Expectations, and Defining Success**

The Y2K drama was set in a backdrop of media clamor and doomsday predictions. That is not to say the potential consequences were not, in reality, ominous. The broad media coverage gave the topic full play.

The predictions around Y2K were dramatic. The Gartner Group predicted that at least 90% of the mainframes would fail because of improper date computations if timely correction did not take place. Gartner further estimated that globally, there were over 200 billion lines of code in need of correction and that the cost of doing so would fall between $300 and $600 billion (Lemke and Brandyopadhyay, 1999). In addition to problematic software, hardware was at risk. Many older computers would require BIOS upgrades to properly process the date. Upgrading hardware was the easier of the two issues.

What were the expectations of Y2K in the IS Division? IS Division interviewees expected that there would be rioting in the streets because non-compliant systems rendered financial systems inoperable; reports would be in error; some people would get money; some people would lose money; failure of the power grid to deliver electricity. “The big concern
was financial.” One manager credited the dire predictions of the media with the increase in the IS Division’s productivity. “Productivity went up. Maybe because of the hype, the group worked. Everyone worked together for the common goal.” The responses seem extreme in retrospect, but the fear was real and drove much consulting and law enforcement interest.

**Urgency**

Urgency was another factor that resulted from the media broadcasting expectations. The inflexibility of the deadline for Y2K compliance exerted pressure. “There was a sense of urgency during Y2K, to get it done. Even after Y2K.” The feeling of pressure to complete the work escalated as the date drew closer. “At first the employees had knowledge of Y2K, but their response to Y2K lacked urgency. As the date got closer, Y2K activities increased in priority.”

This urgency motivated several actions within the IS Division. One area of concern was labor: having sufficient number of skilled employees to complete the task. The Division reached out in several directions, recruiting from the pool of qualified contractors as well as reaching out to previous employees, recruiting skilled employees from other parts of the university and identifying student workers. Wages were an incentive; the university offered to pay employees higher wages as an incentive for them to stay and contribute through the entire Y2K process.

The urgency of Y2K provided the impetus for allocating funds to purchase several overdue upgrades for supported systems. Activity snowballed as Y2K approached. “Y2K was not considered a trivial thing. The work was important. We were gratified to see that about 6 weeks from the end that much concern and caring. People saw the work as important.” The urgency of the situation prompted cooperation to attain the goal of compliance.
Y2K was also characterized by its complexity, exemplified in the range of clients from 200-300 different departments, all with individualized applications. The most complex work involved corrections on the mainframe. Three layered underlying technologies were underpinnings to the basic applications. These included the Operating System (OS), the Database System (DB) and the Programming Language (PL). While one team was working on the applications, another group was working on the systems. The OL, DB, and PL upgrades were performed on virtual machines. A test environment had to be created for the OS, DB and PL and the existing code migrated to the test environment. One manager quipped, “We were testing the OS while we were working on them. It was like tuning up a NASCAR when you are doing 150 mph.”

Some employees said they felt apprehension until after they really got into the work. Once immersed, they “didn’t worry as much about it.” There were comments that the urgency continued after the completion of Y2K and the results were proven to be successful.

* A Quiet Night

In contrast to the dramatic predictions and beliefs that Y2K would bring complete disruption, the date came and went without incident. Almost all of those interviewed declared that Y2K was a non-event. In their view, they had worked on this project for more than a year and a half and, at the end of it all, nothing happened. One said, “It is hard to celebrate something that didn’t happen.” Another stated, “Maybe something external would happen. People were more concerned with external things than internal things.”

IS employee response concerning the outcome of Y2K were largely negative. Many are listed below:

“Y2K was looked at as the biggest nonevent….”


“Y2K was a non-event. What happened? Nothing happened. No one was rioting in the streets. All the doomsday stuff didn’t happen.”

“Y2K was a big fizzle.”

“Y2K was overblown, because nothing happened. There were high levels of hype. People were disappointed.”

“Y2K was a nonevent for us.”

“Everything was done and it was a let-down.”

“The general feeling when it was over? ‘Boy, was that a non-event.’”

“A lot of Bruhaha about nothing!”

“It was a letdown…Expectations were that something would happen. It couldn’t all go right.”

“Boy was that a non-event! It was a non-event, because there was a lot of preparation but nothing happened.”

This was one of the strongest themes in the study. It was clear in the study that after all their work and the extreme predictions, interviewees expected something to happen, even if it were negative.

While the outcome of Y2K was declared a non-event, the process to achieve the outcome was usually viewed positively. “We had a good organization. Everyone pulled together…no one was disgruntled. There was no backlash. No one complained…” “People were excited. Y2K generated an excitement that everyone was working together.” “It was a fun time.” One manager did call Y2K a major success and another stated, “The reason it worked was that a lot of people took it seriously and nothing happened.”

**Defining Success**
The work of Lim and Mohamed (1999) concludes that “success is a rarely agreed to construct” (Jugdev and Muller, 2005, p. 24). Looking at definitions of success may provide a perspective for the seemingly disparate responses.

Success has had varied meanings depending on whose perspective is under consideration. Y2K was undertaken as a project, so we can go to project management literature to gain some insight. What we find is a “moveable” definition that has evolved over time (Jugdev and Muller, 2005). Society has become familiar with a financial model of success that considers tangible assets and places a dollar value on them. Corporations value assets that contribute to competitive advantage (Barney, 2002). Early project management measured project success based on efficiently managing time, cost, and scope (Atkinson, 1999). Project success is often assessed at the closure of the project when information about outcomes is available (Munns and Bieirmi, 1996). Recent success definitions require involvement of the stakeholders (Atkinson, 1999, deWit, 1988).

There are examples in which poorly managed projects were still viewed as successful. “For example, the Sydney Opera House took 15 years to build and was 14 times over budget, yet it is proudly displayed as an engineering masterpiece” (Jugdev and Muller, 2005, p. 22). We can see that success had both objective and subjective dimensions and holds different meanings for different observers (Freeman and Beale, 1992).

Expanding the definition of success, March, et al. (1991) includes the effects of collateral events, those activities that occur in the process of performing the work and before the close of the project. These activities can contribute to learning and can be considered part of the successful outcomes. We can also extend the definition of success to include that period after delivery which involves the assessment of stakeholders, the community, and the organization (Atkinson, 1999; Jugdev and Muller, 2005). In summary, the definition of
success over time has expanded from asset and outcome based definitions to include the experience of collateral events and post-outcome assessments.

Theories of cognitive dissonance may contribute partially to the explanation for labeling Y2K as a non-event. Cognitive dissonance occurs when inconsistencies exist between a person’s attitudes or between attitudes and behavior (Robbins and Judge, 2008). According to Festinger (1957) any type of inconsistency produces discomfort and people will act to reduce the dissonance and, consequently, the levels of discomfort. Further, individuals will seek a steady state in which the dissonance in minimized. The handling of dissonance will be influenced by the degree of inconsistency as well as the rewards that are given for being in the dissonant situation. Incentive raises were received during the performance of Y2K activities. The increased remuneration could be considered as a reward for collateral activities. Incentive raises were received during the performance of Y2K activities and increased remuneration could be considered as a reward for collateral activities and not tied to the outcome. Participants handled the dissonance by calling Y2K a non-event, resolving the two dissonant factors.

The shift in the attitude of participants from high energy and involvement during the implementation of Y2K remediation to the letdown after it was concluded is an important finding, because the shift discredited the event, essentially “leaving the scene of the project emotionally.” This result can inhibit the possibilities of both learning from Y2K and carrying those lessons forward into the next project. In organizational learning, an organization learns from that which it experiences. Organizational changes (in policy, procedures) are stimulated by the experiences, and if the changes don’t lead to positive consequences, they are unlikely to remain as organizational practices (Cyert and March, 1963). Defining the outcome of the Y2K
work negatively, as a “non-event,” lessens the likelihood that positive learning will be recognized and retained.

*Relationships, Trust and Cooperation*

One of the characteristics of Y2K globally was the formation of new relationships brought about through the discovery of interdependencies. In general, responses indicated that few new relationships were formed during Y2K; instead, there were reports that the scope, and, perhaps, the intensity, of existing relationships increased. “I did not work with any new people during Y2K. In my position, I work with everyone on campus. In Y2K, I worked with the same people but was more broadly involved. I did, however, observe people coming together that didn’t work together before – other parts of the university and IT working together.”

There is evidence, that new people did join the Y2K project, some in very key positions. Dr. Albert, and two other managers were all recruited from other parts of the university. Student workers were also added. About one third of the workers were consultants who were outside contract workers. It could be speculated that these employees were known because of the ubiquity of IS work in campus. However, this was not stated.

There appeared to be some ambiguity in reports about forming new relationships, but most agreed that they did not work with anyone new. The intersection of new people impacts the organization, because according to Wheatley (1991), when new people come together for the first time, information is created. Therein lies the potential for learning.

*Internal Relationships*

Most of the Y2K work was done internal to the university. None of the interviewees reported being personally involved in new internal alliances. However, one response was key in describing the influence of Y2K on existing relationships: “[In Y2K] relationships changed.”
Knowledge wasn’t power. It was a commodity to be exchanged. People were receptive to other people’s problems. They had the attitude, ‘What can I do to help?’”

**Cooperation**

Cooperation was important in achieving compliance. Cooperation was needed from the various client departments. “In Y2K, everyone was very cooperative. The way I found them to be cooperative was different than I had expected. I found we were more successful on compliance when they [employees] were able to identify with their departments and divisions.” Another manager cited the seriousness of the situation as an impetus for cooperation. “We didn’t have to remind them that if they didn’t cooperate with us, their stuff wouldn’t work on January 1.”

**External Relationships**

External contacts with those entities outside of the university were reported to have occurred mainly through websites. “We did a lot of checking around to see what others were doing. We [Kent] had a website. Most of the universities had websites. We used vendor’s pages, Microsoft, mostly.” One interviewee reported attending a 1998 conference sponsored by the Ohio Higher Ed Computer Consortium in which Y2K was a major topic of discussion. “There were intense groups on Y2K desktop preparations. I brought back useful information.”

One manager described her struggle to bridge to other parts of the university to obtain compliance information from various university departments. Her comments indicated a need for personal involvement. “When I hooked up people who knew each other, things seemed to happen. What was needed was the personal touch.”

**Relationships with other University Departments**

The IS Division was required to check and assure the compliance of equipment in about “200-300 departments” within the university, although each department was responsible
for identifying and cataloging its own equipment and reporting that information to the IS Division. According to one manager, coordination with the departments required relationship building to establish the necessary cooperation and to achieve the information required to determine compliance. “I needed to buddy-buddy with each department.”

A check list was sent out to each department; the department was asked to determine their status with respect to this list of items. “We feel that if you are in compliance with these [basic] things, then you are probably in overall compliance.” The structure of the project with respect to the departments was decentralized. One manager whose responsibility it was to coordinate departmental compliance would go to each department and say, “Here are the standards,” and the department would sign off.

Desktop support was done by each individual department. “Databases were stand alone, individualized. They did not interface with anyone. We had to rely on the departments for the databases.”

Critical tasks among the departments were those dealing with the university’s financial affairs. “It was very important for Finance to have their ducks in a row.” The “economic areas” of the university, however, didn’t see Y2K as a high priority. They didn’t have any technical people and needed help. “They didn’t use computers a lot and didn’t understand how they worked.”

One manager who believed strongly that unity was necessary to achieve success in Y2K observed: “Most employees were loyal to their departments. They had not identified with the university.” The manager went on to comment about the apparent division between the university and the departments, and the division among the departments.

“I didn’t think it existed to that extent here until I did something that had that [large of an] impact. I know there are differences – liquid crystals, fashion museum – the university trying to do branding [by emphasizing different distinctive departments]. But this [Y2K] is about seeing the university. I knew it was there, but not to that
extent...The degree of loyalty was to the university divisions. Loyalty to the university got lost.”

Interviewees described their clients from other departments within the university as “functionals.” These were the employees who carried out particular functions within their own departments, e.g., registrar, bursar; they were in charge of systems and interfaced with the IS staff. IS staff worked with the “functionals” on an ongoing basis and reported a good relationship with them. “The functional people were hit from three sides: [referring to corrections required for Y2K]. They had to perform their regular data runs, create and run ad hoc reports, and perform system testing.”

Trust

One interviewee commented that trust was gained in the Y2K project. “Responsibility was pretty much divided. Everyone was elevated together. No one was singularly elevated – all of us together. It brought some self confidence to people. Some people learned to trust where they had not trusted before.” Also, “They found they could trust people they had not trusted before. It made them feel good about themselves. And that is very important. Self confidence endured after Y2K.”

Trust may be further inferred from other comments. “Sharing of common goals...pretty interesting. Productivity went up, maybe because of the hype. The group worked; everyone worked together for the common goal.” This statement about sharing a common goal and working together to achieve it implies that trust was a factor. Trust is important in generating a willingness to share knowledge among groups and group members, enhancing the opportunity for learning (Argote, 1999).

I asked Dr. Albert about the emergence of trust – did it surface and, if so, did it continue? He reported:
“Soon after Y2K, we implemented Web for Students, Web for Faculty and the initial Flashline portal. Trust was still high. [Dr. Albert estimates that to have occurred about 2002.] After 2002, there was a three year period before the upgrade to the new ERP was decided. During this time we were treading water. Both the self confidence of the team and the trust of the clients [other departments within the university] suffered.” (personal communication)

Dr. Albert speculates about his own ability to maintain the trust of his staff.

“As for trust in me, it was reinforced when I was reassigned to the network area and successfully handled major problems that arose from a large network upgrade project. My guess is as an individual or as an organization, you need to do something positive, that is fairly substantial every three or four years to retain a high level of trust.” (personal communication)

The need to renew the basis for trust is an important observation that may relate to the process of feedback. Trust is an important factor; the trust among members is important as an influence for members admitting or owning up to their lack of knowledge (Cross and Prusak, 2005). Trust must start at the top as upper management communicates trustworthiness to members. It flows downward through the organization. If top managers are trustworthy, it will eventually permeate the organization and gain visibility as the character of the organization. Dr. Albert proved to be trustworthy leader, as he was consistently portrayed by interviewees.

Trust is gaining increased importance in organizational studies (Mayer, Davis, and Schoorman, 1995). However, the study of trust has been considered a knotty problem for several reasons; one is agreement about the definition. Another is the relationship between risk and trust. “It has been asserted that being willing to take risks may be one of the few characteristics common to all trust situations” (Johnson-George and Swap, 1982, p. 1306). Y2K required a willingness to take risks and engage in the novel process of correcting unknown errors in the date function. Trust supported the Y2K work by supporting risk taking. Trust is a necessary precursor for sharing knowledge that is mutually beneficial (Fineman, 2005)

*Reflection and Standardization*
Reflection

Reflection is considered essential to organizational learning. Reflection is evident in the questions that are asked by individuals and the organization. A section on questions asked in the project has been compiled from the data and included in Appendix B.

There were two significant indications of reflection during the Y2K process. The first occurred when Don Tolliver questioned the effectiveness of the IS Division and asked, can we do this better? This questioning is equivalent to Smith and Elliot’s (2007) statement of need for recognition that “all is not well with our current state of knowledge” (p. 533) as a prerequisite to second order learning from crisis. This significant incident of reflection had a long lasting impact on the organization. Here is the story based on information from Dr. Albert:

During the Y2K period, Don Tolliver was interim director of IS. He wasn’t an IT expert; he had a library background. It was apparent to him that Y2K was not being addressed properly early on. That was why Dr. Albert was brought in. But Y2K was not the only problem. The implementation of the large network was also not going well. Reflecting upon this, Tolliver decided to invite CIOs from other universities to observe the Division’s operations and make recommendations.

The CIOs visited and conducted an overview of operations. They made recommendations that impacted the Division for 3-4 years. In fact, some recommendations are still being followed. Their influence was apparent in the recent Banner Systems implementation.

The report criticized the leadership in Application Development, particularly as it relates to Student Information System (SIS), implemented in February, 1996. One the review group’s specific recommendations was to stay closely tied to the vendor. IS had broadly modified programs. There were many customizations on the application side. The IS Division had only sporadically applied the vendor’s modifications. The reviewer’s key recommendation was “You bought the software. Don’t mess it up. Apply the vendor’s modifications in a timely fashion.”

Standardization of features has become a policy within the IS Division. Only in exceptional situations are exceptions permitted.

According to Dr. Albert, Y2K was instrumental in bringing about the expert review.

“If it were not for the problems of Y2K, they would not have come at all.”
There is also a second instance of reflection. It may be inferred from Dr. Albert’s statement: “we had initially gone down one path, but decided we needed to go down another.” This statement referred to changing the course of the project by terminating the relationship with CAP Gemini and committing to updating the system with SCT Sungard. It implied that there was a decision point in which, upon reflection, it was believed that one course of action was not working or producing desired results and another course was needed. Dr. Albert conducted an inquiry to determine why the vendor’s upgrades were being shelved in favor of the consultant, CAP Gemini’s, modifications. In the absence of a reasonable answer, Dr. Albert took corrective action, ceased dealing with the modifications and chose to implement the vendor’s upgrades.

A third example regarding reflection from the interviews illustrates a failure to reflect. When asked about reflection on Y2K activities, one interviewee responded, “I don’t remember looking back – saying what we did was right or wrong. Everything went well, therefore we didn’t need to go back and debrief.” This attitude would inhibit learning.

Lost Opportunity

Lost opportunity can arise from individual members acting in such a way as to reinforce conditions for error. These actions are called primary inhibitory loops. As long as conditions for error continue, individuals cannot be effective in acting as agents for organizational learning (Argyris and Schön, 1978). When the organizational theory in use maps and images become scattered, ambiguous and vague, they cannot be used to test for organizational errors in action. Because errors cannot be detected, members lose the opportunity to conduct joint inquiries and then to restructure key elements of the organizational theory in use.
In the case of Y2K, the organization experienced a successful outcome, however on reviewing and challenging the process, the organization may have realized greater gain, e.g. achieving greater clarity in the relationships with other departments, an area that surfaced as potentially having ambiguity in this study. Developing new strategies for error correction could have included creating new approaches for managing relationships with other departments within the context of decentralization. (This did occur at a later time when the Shared Services section was created.) Responses that do not reduce ambiguity are dysfunctional and serve to perpetuate the ambiguity.

IS employees’ response to Y2K was influenced by an assumption that “when you’re successful, something happens.” Their assumption was distorted by the media hype. Effort to reframe the outcome could have impacted employee belief about success and thus the way the organization perceives, prepares for and responds to success.

Reflection is needed for deutero learning to occur. It requires that organizational members “reflect on and inquire into previous episode of learning, or failure to learn” (Argyris and Schön, 1978, p. 27). In doing so, they come to an understanding of what aided and what retarded learning, and, then, create new strategies for learning. The process is iterative. Members produce new strategies and then evaluate the results as the basis for new learning. Each time, the results are encoded as individual constructs and become embedded in organizational learning practice.

After Y2K

According to one of the key Y2K managers, productivity went up during the project. He wanted to build:

“regular departmental non-Y2K activities onto the end of Y2K activities, utilizing Y2K momentum. ‘Everything in the Division had been brought current. We were up to date. I wanted to build on that, to use the same approach. I thought, ‘Now we have
the opportunity to do some other things. Let’s use this opportunity to get ahead.’ But this didn’t happen. After Y2K, people rested.”

There were parties and congratulations, but then a return to complacency.

**Recognition**

Y2K was followed by a party to recognize the Division’s successful work. Staff were given tee shirts as an emblem of their success.

**Letdown**

Interviewees commented that they experienced a letdown after Y2K. One participant reports, “Everything was done, and it was a letdown. Everyone went back to old ways. There was separation among the groups that had worked together.”

Calls to the Help Desk inquiring about the effects of Y2K ended after the first week of the new year.

The data base created to track equipment for Y2K was not used after the successful date change. However, one interviewee commented that the self-confidence that the workers gained in successfully executing the Y2K correction endured after Y2K. This was confirmed by Dr. Albert. As reported in an earlier section, comments indicated that during the Y2K work, trust was developed. “They found that they could trust people they had not trusted before. It made them feel good about themselves. And that is very important.” In retrospect, some looked back on the period “fondly. I don’t think anyone minded putting in the extra work.”

**The Important Role of HR Management in Y2K**

HRM emerged as an important, if not highly influential, organizational function during Y2K recovery, although it was given little recognition. (I am not speaking of the HR Department, but the HR function.) Y2K was a technology-based problem but it required
human intervention to repair. Human capital was needed to perform the work of Y2K; it required a skilled labor force, those with programming skills, particularly COBOL. The stakes were high. Critical systems could fail if work was not performed correctly. Technology was a tool, but Y2K pivoted on human capital. New technology was purchased to achieve compliance, but it was implemented through the human worker, and the need for a competent human interface was enormous.

HR played a significant role in Y2K as organizations were confronted with key questions such as: How many employees will stay home out of fear during the period of the date change? How will we overstaff for critical periods? How will we recruit and retain Y2K experts (Sullivan, 1999)? Part of the learning within organizations in Y2K was the value of their labor force.

The scarcity of skilled local programmers needed to work on Y2K corrections caused companies coping with Y2K problems to push out internationally. If the local labor market could not supply needed resources, the alternative was to reach out globally. Tom Freidman reminds us, “remember that the only country that had enough software programmers to adjust all these computers so they wouldn’t go haywire, and do it at a reasonable price, was India. And remember that it was this huge operation that launched the Indian outsourcing industry” (Freidman, 2007).

The role of HR in organizational learning is critical on a number of fronts. It is particularly focused during Y2K. Failure for many companies has been attributed to being overly focused on technical problems and neglecting human resources (Cross and Israeli, 2000; Ruggles, 1998; Lopez, Peon and Ordas, 2006). Lopez, et al. (2006) point to the relationship between HR and organizational learning as under researched. Studies indicate that
there is a positive influence of some HR practices on learning, but empirical evidence is lacking.

A cluster of HR related themes dominated the results of the Y2K inquiries. These themes included acquiring an adequate labor force to address Y2K in skills and number, wage rates, retention of staff, contract workers, administrative changes, workforce morale, teams and training, recognition. All of these areas played a significant role in the successful completion of Y2K.

Looking at HR impact within the IS Division using Kleimann’s model of HRM Practice

When the large number of HR related responses emerged as data, it became apparent that it would be useful to choose an organizing model. Lawrence Kleimann’s (2007) employment life cycle model presents a clear framework for examining HRM issues as they were presented in Y2K. This model is shown below:
Applying the four practices shown on the left side of the model: Pre-Selection, Selection and Post-Selection Practices as well as Practices Affected by External Factors of the model, will help frame the HR influences on the Y2K Project.

1. Pre-selection Practices includes:
   a. HR planning: demand and supply analysis, workforce assessments, planning for HR needs within the organization and looking at the availability of potential employees to fill the need within the labor force, and
   b. Job analysis, gathering, analyzing, and documenting specific information about the jobs to be filled.

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2. Selection Practices includes all those activities that relate to making a decision about who to hire. Selection practices include recruiting, screening to determine if applicants meet the criteria for the position, and, finally, deciding which among the candidate for the position are most qualified.

3. Post selection Practices are used to manage employees once they have signed on to the organization. The goal of post selection practices is to optimize employees’ performance: to support retention of employees and to enhance job satisfaction though performance review, compensation, training and development, to the end that employees will be motivated to do their best toward achieving organizational goals.

4. Practices Affected by External Factors The employment cycle operates within a legal, social, economic, and technological context. Issues of workplace justice, unions, environmental concerns, and globalization strongly impact HR practices and must be viewed along with the three major phases of the employment cycle.

*Employment Life Cycle within the IS Division during Y2K*

This section looks at the employment cycle during Y2K within the framework of Kleimann’s model. The section concludes with the environmental influences. It is this latter contextual effect that exerts a very powerful pressure on Y2K activity all over the globe.

*Pre-selection Phase*

HR Planning included the pre-selection phase in the employment life cycle entails HR planning, taking into account workforce supply and demand and job analysis. The IS Division was concerned with planning for staff, including having an adequate number of employees to fill the needs of the Y2K project.

In April 1999, when Dr. Albert arrived in the Division, there were about 10-12 contract workers. “What we discovered was that there were so many people [in one area] we
couldn’t manage them properly. We cut back to 6-8.” The Division needed to select those who were most skilled to retain. Overall, in the Division, one third of the workforce had been lost and needed to be replaced with qualified workers.

COBOL programmers were considered essential to the success of the Y2K effort and in great demand. Coding was done in COBOL. “The date problems were primarily in areas using old antiquated COBOL systems.” The loss of COBOL programmers was of great concern.

The IS Division had to learn what type of workers would fit the Division’s needs, where to find them, how to retain existing workers, how to attract those with specialized skills who were in short supply.

Selection Phase

Selection includes recruitment, screening and making the decision about the best qualified employees to be hired. The organization, including upper levels of university administration, learned that selection processes are related to compensation. Pay was offered as a significant incentive for recruiting and retaining workers.

1. Recruitment

The Division used multiple methods to fill its labor needs. The first move was to conduct a call back from among those who had left the department for “greener fields.” In all, five were brought back. The next course of action was acquiring consultants, or contract workers. These workers were temporary and filled the void while IS was seeking to rebuild its staff. A third course of action was to recruit student workers to supplement IS staff. Students developed web pages. They also applied Microsoft updates to PCs. Students functioned in SWAT (Special Weapons and Tactics) teams. They were sent to departments that did not have staff to perform the Y2K fix. To fill its management needs, the Division also recruited skilled
staff from among existing university employees who held administrative positions in other departments. It is notable Y2K workers cut through the University horizontally and vertically. “Workers included programmers, computer operators, directors, administration and staff.”

Consultants represented special cases. The Division of IS hired consultants, or contract workers, to perform internal tasks as a common HR practice. “The Division used a lot of consultants during Y2K…who already had the required expertise. The key reason for calling in consultants is to obtain the required expertise.” Regular staff and consultants worked together on the same teams. Consultants assisted with COBOL programming, checking PC’s, and testing programs.

What impact did the consultants have on the Division? They were temporary workers, hired at a salary above the average for their classification. They were brought in for their expertise is specific areas. They were trained by the Division. Some were good. Some did not perform to expectations. Their contracts were time limited, so that after a contracted period of time, the Division was no longer required to support them. This mode gave the Division a certain element of flexibility, limiting the investment in an employee while creating an internal profile of expertise. It allowed flexibility in responding to the labor needs of the Division, both in terms of expertise and number.

The interviews provided no evidence that the consultants had an impact on the relationships or operations of the Division, no indication that they “left their mark,” i.e., bringing in an exceptional skill that expanded the expertise of the Division or diminishing the Division by the loss of their knowledge or capabilities when they left. They applied their knowledge to problems at hand. When the problems were resolved, they left.
It is clear they performed work and that the work they performed was valuable in achieving Y2K goals. Their role seems to be more like that of a “temp” that was part of the Division’s model for HR planning.

In analyzing the relationship between HRM and organizational learning, Lopez, et al. (2006) found a strong positive relationship between selective hiring and organizational learning. Further, organizations that set learning as a goal can begin to achieve it by hiring employees with a desire to share learning (DiBella, 1996; Williams, 2001). The Y2K consultants shared their knowledge with local staff.

2. Selection

Screening was also performed in the Y2K project. The consultants supplemented the need for COBOL programmers. This approach was somewhat problematic in that Y2K consultants often oversold their skills, “people selling themselves as what they weren’t.” Skill verification was needed. When the Division was overstaffed with consultants, they were evaluated in terms of whether or not they were performing useful work. “Were they doing something or not?” Those consultants most skilled were retained.

Post selection phase

The Post-selection practices include training and development, performance appraisal, compensation, and productivity programs. Training and compensation were critical to securing the needed workforce and achieving desired levels of performance.

1. Training and Development Some training was needed but, based on the comments of interviewees, it was minimal. Many stated they received no training. Others described their work as doing what they usually did but on a broader scale. One respondent said he had attended a conference in which Y2K was the dominant topic of discussion. Student workers received training. Consultants/contract workers provided training, e.g. in BIOS, the operating
system. Training also had to be provided to consultants. Much of the knowledge of Y2K was gained by doing, talking to vendors and checking web sites, getting advice from others who were also engaged in the process. “How to” information was shared world-wide. Dr. Albert reported that training was provided primarily through internal communications, seminars and meetings. Those who attended seminars would bring back information for distribution. A Listserve was one way information was distributed. Most of the training was “on the job.”

2. Team Development Teams were important to implementing the work of Y2K. “Teams consisted of the personnel normally assigned to manage the application or technology. Consultants were used if the project plan required additional resources.”

The consultants added expertise to the teams. “They continually kept abreast of the Y2K issues and brought this information to us to incorporate with our KSU plan.” “KSU employees felt relieved that there was someone to guide them, and the interaction with the consultant and staff could best be described as positive.” Teams shared knowledge. Teams aided the Y2K project because they represent access to a wider range of information than individuals and they make fewer errors (Argote, 1999). “Teams … learned who is good at what, which approaches to the tasks are effective, and how to coordinate their activities. Teams that have learned to work together effectively are worth much more than individuals” (Argote, 1999, p. 99). Failure to share knowledge can have negative consequences for a group (Argote, 1999).

3. Performance appraisal Performance appraisal had a role in the selection process as a means to eliminate those consultants who were not performing satisfactorily. They were replaced with more skilled workers.
4. Compensation Prior to the onset of Y2K, compensation for workers within the IT industry activity was not as high as it is today. Remuneration for IT workers within the University was as much as 40% lower than pay within the industry.

As the date change approached and IT workers were in demand all over the globe, wages started to escalate. This had an impact on the university as IT employees left to find higher paying jobs on the commercial side of the industry. The University recognized the need for skilled IT workers to handle its Y2K remediation and provided significant financial incentives for workers to remain. Of specific concern was the loss of COBOL programmers.

“Thank God for Y2K. We all got a raise. The best raise we got in 10 years. It did keep a lot of people here. Administration was concerned about not being able to operate properly. The 10% raise was helpful. For many years we earned 20-50% less than going to work outside. If you made $40 K here, you would earn $50 K outside.”

“As IT has grown, we found out that pay had to match the [outside commercial] rate. It is pretty comparable now.”

The total financial incentive for each individual in the IS Division was: 10% raise on their current salary; 5% one time bonus, plus 5% merit pool increase on top of 3% annual increase. This represented an increase of 23% for 2000, a permanent salary increase of 15% plus a 3% annual increase. The requirement was that employees would stay and assure the success of the Y2K corrections, at least through July, 2000. In addition to providing wage incentives, the University was sending a message to staff that the Y2K work was important and IT skills were valued. The IS Division reached out to workers who had left the institution and offered them salary increases to return. Five did.

IT employees were valued more highly for their skills as the number of workers grew scarce and the need to achieve Y2K compliance grew urgent. “Y2K started the realization that you have to pay talented people to do IT work.” Employees felt they gained value in the eyes of the University. This was manifest through higher pay, significantly higher pay, according to
Some of the wage increase within the IS Division of the University as an important part of their Y2K story.

In addition, Y2K staffing presented HRM with the need to accommodate unique compensation issues such as the payment of burgeoning overtime, re-definition of shift work, accommodations for holiday pay when employees were “on call.”

5. Recognition Post selection also involves recognition. The Division held a Post Y2K celebration for employees. T-shirts were distributed to all who participated.

HR is moving to the front as a subject in organizational learning research (Easterby-Smith and Lyles, 2005). A redefinition of approach is proposed for some areas of HR. For example, organizational learning literature suggests an alternative to tying compensation to the job. Rather, it suggests compensation should reinforce experimentation and transfer of knowledge and stimulation of knowledge exchange and sharing (Pil and MacDuffie, 1996; Yahya and Goh, 2002; Lopez, et al., 2006).

External Factors - Globalization

The international influence was most pronounced as Y2K was a global phenomenon. The work of Y2K was defined by global dependencies. Interrelated and interconnected systems that spanned the globe were at risk for failure, creating a domino effect that could potentially impact financial and social systems world-wide. Thus there were intense pressures by business and economic interests to “get it right.” There was a coordination effort globally to achieve compliance which required following complex threads of interdependencies to assure that all links in the chain of communication among the related software and technologies would correctly handle the date change. The scope of media coverage was global, and the urgent message of Y2K was quickly spread. An example of the potential
disruption resulting from failure to address the Y2K problem may be found in the port of
Singapore, an electronically linked shipping community:

“[Officials highlighted] the repercussions that Singapore, as the world's busiest port
with more than 130,000 vessel calls [per year], would face if its port operations were
disrupted by the Y2K bug. They include safety problems in port operations, delay in
cargo delivery, and loss in revenue as well as loss in port users' faith in Singapore.
…The millennium bug could also pose dangers for the shipping industry.
Navigational safety aids on board ships that are Y2K prone could result in maritime
disasters such as vessel collisions. Hence, [officials] stressed that it was important for
every organisation – every government agency, every shipping line, every ship owner,
every port terminal operator, and every business large and small, to work together to
address the pressing concern.”

The enormity of this global effort demanded a skilled labor force, programmers,
analysts, technicians. The wide-ranging demand and the urgency for help increased wage
incentives as wages escalated world wide for workers with skills to perform the Y2K fix.
Consulting companies went international, opening multi-national offices to offer services.

The IS Division at Kent State participated in this global span when it hired a French
consulting firm to perform its initial Y2K work. When the company’s work was done, the
result was two program parts that did not interface (Blythe and Nogy, 1999). Dr. Albert found
that:

“Rather than using our vendor’s software [to correct for Y2K] we were using another
vendor’s software, a French company, a large consulting firm that had been
conducting a huge Y2K effort World wide. The company had set up programming
centers across the country.”

The IS Division lost about 1/3 of its employees to the pull of lucrative positions for
technicians and programmers available throughout industry. The job market was “hot” for IS
practitioners. According to Dr. Albert, “anyone who could turn on a computer was selling
themselves as an expert.”

Other Related HR Themes

Teams
The work of Y2K was done in teams of 3-4 persons. They were of a mixed composition, IS staff, consultants and students, heterogeneous or diverse. However, the data lacked any information about the types of activities, quality of interactions, etc. There are inferences that can be made based on the emergence of trust as a learned attribute, remarks about high levels of cooperation, staff being “elevated together.” The work of teams is not specifically addressed.

Changes in Administration

Changes in administration were influenced by two factors. The first was the history of low morale in the Applications Development section. Turnover among both the staff and the managers in Applications Development was high. An outside investigation attributed this to being discouraged in advancing their agenda (Blythe and Nogy, 1999).

“Early work had been done to develop Web applications for registration, class schedules, equipment inventory, and facilities (building and room) management but this work was cancelled. Early work had also been done to develop a data warehouse, but this work was also cancelled. (Blythe and Nogy, 1999, p. 1)

Low morale was reflected in poor performance and lack of leadership by Application Development managers, especially with regard to the SIS. (Blythe and Nogy, 1999)

The foundations for a new Security section were being laid, but progress toward this outcome was uneven. One interviewee commented, “the department [IS Security] was reorganized with false starts.” The Department was initially formulated with a director and three staff workers from the Networking section. Because of an HR irregularity in naming the new security staff positions, the staff was removed and reassigned back to Networking. Security was reduced to a department of one.

Don Tolliver joined the IS Division as Interim Director in 1999. After an open search, he was selected and appointed Vice President of Information Services in 2000, and at that time, IS moved from the Finance Department to become an independent division, headed by
its own Vice President. Tolliver remained with the Division until about 2004. One interviewee commented, “Y2K did have an effect. Administration changed. Deck shuffling.”

After Y2K

The composition of the Division changed after Y2K. Two sections, Shared Services and Educational Technology were added. Some regular staff and consultants left. Regular staff that left did so voluntarily to take advantage of other opportunities in the field. After 2000, the Division grew.

The Emerging Importance of HR Management

HR Management and human capital were listed as the second most important area for research during the next ten years according to a panel of experts convened for Easterby-Smith and Lyles’ (2005) highly referenced Handbook for Organizational Learning and Knowledge Management. HR Management was also listed among 11 topics of articles published in the last two years in six leading journals and research topics having the greatest impact in the next five years. The HR category included issues of human capital and people considered to be knowledge workers, boundary spanners or expatriates. The HRM area includes social capital, knowledge workers, employees, human competence and their relationship to organizational learning (Lyles and Easterby-Smith, 2005).

Summary: Areas of Learning that Emerged from Y2K

There was evidence that single, double, and deutero learning occurred in response to Y2K. Single loop learning is represented by the Y2K date corrections. System errors were corrected, and this change, of itself, did not change operations in the IS Division. There were three major areas of double loop learning that emerged during Y2K and have continued as a part of organizational practice through to the present.
1. Ending the common practice of modifying/customizing code for programs and relying on policies on standardization, staying with the original vendor releases. Instituting practices to reduce the requests for customization among client agencies.

2. Level of trust among team members that developed during Y2K, continued within the department, and was reflected in subsequent projects.

3. Increased compensation that communicated value to the IT employees and encouraged retention over time. This increase in compensation brought IT workers’ salaries and benefits in line with rates paid by commercial enterprises.

These are summarized in Table 5.

Dr Paul Albert summarized the effect of Y2K learning on the IS Division as follows:

“Yes the learning was good for the organization. It allowed us to successfully launch the Web for Students and Web for Faculty products. However, after about 3 years we became ‘stuck’. We had planned for upgrading the applications to a new ERP; however, there was pressure to work with other Northeast Ohio Universities. This pressure put our plans on hold. The holding pattern lasted for two years eroding the learning / trust that had been developed. Eventually (2006) we did move forward with the new ERP, this has helped to rebuild the learning / trust once again” (personal communication, January 24, 2008).  

In the occurrence of both standardization and increased compensation there was a cognitive shift that was reflected in the change in the organizational structures, i.e., policies, etc. Trust as learning is less tangible than learning to standardize programming policies and learning to value employees as shown in increased compensation. However, trust fits the requirements of organizational learning defined here in that it represents both a cognitive as well as a behavioral change and was embedded in the organizational culture. The embedding can be in structures such as routines, systems, strategies. “The organizational learning system

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8 It should be noted here that the value judgment of “good” is taken from the organization’s point of view. Standardization streamlined IS Division operations and improved management efficiency. This research reflects the data collected, and only the organizational view is represented. A more dynamic approach might be taken in future research that examines the effect of learning on stakeholders.
is comprised of the continually evolving knowledge stored in individuals, groups, and the organization and constitutes the fundamental infrastructure that supports a firm’s strategy formulation and implementation process” (Vera and Crossan, 2005, p. 123). Trust had an impact on the way work was completed. Trust presented differently at times, as reflected in Dr. Albert’s comments concerning high levels of trust in some periods and lower levels of trust in others.

There is evidence of deutero learning at the double loop level, which was rooted in the Y2K experience and continued to manifest over time. The IS Division had learned about the value of trust and compensation and reemployed them as strategies in the current work. Trust and compensation strategies emerged again in the current Banner Project implementation.

Unit of Analysis

This study looked at organizational learning in response to Y2K as the unit of analysis. Learning as a unit of analysis was likened to a “thread” running through the case that would be traceable. The chronology reflects the “thread like” aspect of organizational learning in three areas as reported by interviewees: standardization, trust, and compensation. We were able to identify that these areas have a point of origin within the context of the Y2K event and continue forward in time, indicating that learning was sustained.

An earlier reference discussed the location of learning as residing in the social interactions among individuals in contrast to the heads of individuals or in organizational structures (Easterby-Smith, et al., 2000). There is evidence, instead, that the learning originated in the interaction between the environment (Y2K conditions) and the organizational unit (IS Division).
The continuation of the new behaviors over time and the embedding of policies reflecting these new behaviors in the organizational structure that support the ‘new strategies’ is evidence of organizational learning.

However, the use of a chronology to represent learning events is a linear representation and may be limited in its ability to represent learning activity. Most relationships are not linear, and this is demonstrated in the work of Y2K which dealt with complex systems (Biklin and Cassella, 2007).

“If we are to appreciate more fully the complexity of organization life, we need to move beyond linear representations to capture the complex web of reciprocal, non-linear interactions and relationships between individual (e.g. learning) and organizational (e.g. training) processes” (Antonacopoulou, 2001, p. 328).

In support of this point, Argyris and Schö n (1978) refer to the unstable nature of organizational learning. This instability arises out of flux as the organization is in continual engagement with a changing environment. In emphasizing the need for good organizational dialectic, Argyris and Schö n (1978) point out that new conditions for error can arise from organizational learning and that the process is not a steady state but open ended, and cycles of learning can give rise to new conditions for error, “to which members of the organization respond by transforming them so as to set in motion the next phase of inquiry” (p. 60).

Examples of the dynamic quality of organizational learning as a unity of analysis is evidenced in the data from this study. These examples take us beyond the chronology of learning. Let’s examine the incidences of learning in terms of Argyris’ loops.

Single loop learning is evidenced in the date correction process. Detection of error in Y2K programming led to correction of the Y2K error in programming. This was a simple corrective action that did not change the function of the organization. No new data was embedded in organizational maps.

9 Trust was embedded in the culture, acceptable within Argyris’ (1978) definition of organizational learning
Double loop learning occurred in all three examples of organizational learning. Standardization, trust and increased compensation all corrected error by challenging and changing the organizational structure.

The influence of two of the three instances of learning, trust and compensation, expanded beyond the linear chronology. The use of compensation as a strategy to reward and retain project workers can be seen again in the implementation of Banner, the current ERP project. Banner workers are being given bonuses at the end of each milestone completed. So, 1) the Y2K incentives were institutionalized for the IT staff and continue to the present time. The pay increase indicating a higher value for IT workers was embedded as a permanent change in the organizational maps of the IS Division (and the university). 2) The strategy about the effectiveness of compensation in rewarding and retaining workers was reworked and reapplied in the Banner context, with slight variation. This new strategy was learned “at the second level”: compensation is a useful incentive to retain and reward workers and to increase performance.

It is difficult to know and measure all the dynamic properties of organizational learning. For example, it is possible to know the immediate consequence of increased compensation on the IT Division at the time of Y2K in terms of employees retained and recruited. However, it is not possible to know the impact over time of compensation on retention and recruitment instituted at the time of Y2K. We can see and measure the extension of the learning about compensation and value at work in the Banner Project. We don’t know when or where this strategy will be applied next. We do know that the strategy to compensate workers for certain outcomes has been learned by the organization and is likely to be applied again.
Another example of the dynamic quality of learning as a unit of analysis can be found in the trust factor of organizational learning. Trust among IS Division workers was learned during Y2K. It became embedded in the culture of the Division. It continued through to the present time, except for a ‘down’ period when the IS Division was marking time and waiting for new work to be initiated. In the absence of shared experiences and working toward shared objectives, it lagged. It returned when new work on the ERP was begun. IS Division administration was aware of the value of improved performance arising from trust and consciously supported it into the Banner implementation. In fact, the Division now wants to create a physical space for workers to co-locate so that the workers’ contact with each other that supports the trust may continue into future and not be lost. The organization had learned trust as a strategy at the triple loop level.

It is believed from the results of this case study that learning can be effective as a unit of analysis, but a dynamic approach should be employed. Learning should be approached as a non-linear occurrence, keeping in mind, that some of the effects of learning may not be measurable or evident.
Table 5  
Chronology for Organizational Learning in response to Y2K

<table>
<thead>
<tr>
<th>Start date: 1998</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>Standardization</strong></td>
</tr>
<tr>
<td><strong>Trust</strong></td>
</tr>
<tr>
<td><strong>Wage Incentives</strong></td>
</tr>
</tbody>
</table>
CHAPTER FIVE

Discussion

The purpose of this research is to explore the impact of large scale events on organizations and to determine if organizational learning can be applied as an appropriate framework for understanding the events. Because the research is exploratory as well as explanatory, the research is also looking for other effects.

The data results were discussed in two sections. The first section discussed the themes that emerged in the inductive analysis. The second section covers organizational learning and results of the chronology.

Overview

This case study took place in the IS Division of Kent State University, an academic community of about 23,000 students. Fifteen employees of IS who had been employed during the period in which all three events occurred were interviewed as part of the case study approach. The results of those interviews, reported in Chapters Four, indicate that the Y2K remediation was complex. It was complicated by an earlier practice of creating program modifications and failing to install vendor updates. The 1998 attempt at Y2K remediation by a consulting company left the Division with incomplete and incompatible solutions. An administrator was brought in from another part of the university in 1999 to take over the lead in an internal remediation process which was ultimately successful. This was achieved, in part, by reverting to vendor code.
The scope of the project was broad. It included an assessment and remediation, when necessary, of all the different types of hardware and software in use at the university. Corrections were applied to programs, PCs and complex mainframe operations.

As Y2K approached, employees of the IS Division were working within a set of expectations published by the media warning that failure to correct Y2K problems would result in dire consequences. Their work was governed on an immovable deadline and they felt an urgency to complete the work of remediation on time.

Work relationships were important as Y2K was a human effort to correct a technical problem. Employees reported that they formed few new relationships in carrying out Y2K work, but their work with existing clients was broadened. Sharing information increased in importance. External relationships (outside the Division) involved the 200-300 departments campus-wide with whom IS employees interacted. Employees linked with vendors, but primarily through vendor websites, the source of equipment compliance status information and some “fixes.”

Trust in themselves and others was one of the reported gains of Y2K. This was a change for a department that had been experiencing low morale. Cooperation among staff was high and work was performed without complaint.

The HRM theme dominated the research results. Much was going on during Y2K that involved HR. (The IS Division’s HR related activities were reviewed using Kleimann’s HRM model.) The dominance of HR factors was not surprising in light of the labor intensive nature of Y2K work. The most significant factor among the HR issues was compensation. The university significantly increased the compensation of IT workers on campus to both retain and recruit the manpower necessary to perform the Y2K work.
Teams did not emerge as an important data item. There is insufficient data to draw any conclusions about group activity. Trust is the exception.

One of the most interesting results of the study came at the end of the Y2K project. Work had been successfully performed. The goals of averting disaster for the university had been achieved. Yet, the employees felt a profound let down. There was consensus among participants that Y2K was a ‘non-event.’

There were two instances of reflection and inquiry that surfaced during the research, The Division’s request in 1999 for an operational review and assessment by outside reviewers to create new direction was important to the future of the Division. Initial poor performance in the Y2K work prompted the review. The recommendations from this review team were adopted and are reflected in the operations of the Division to this day.

The act of reflection, that is, taking the time to share and discuss what had occurred in the work experience, has the potential for creating value, e.g. improved processes and product, in future work (Keegan and Turner, 2001). Reflection is critically important to learning. Under time pressures, organizations frequently forego reflection as they continue to focus on production. The sharing of experiences in reflection encourages the building of relationships needed for trust in the organization. Without reflection, outcomes may not be clearly understood and captured for inclusion in organizational memory.
Table 6  Summary of Major Themes in Y2K

<table>
<thead>
<tr>
<th>SUMMARY OF MAJOR THEMES IN Y2K</th>
</tr>
</thead>
<tbody>
<tr>
<td>1. Background</td>
</tr>
<tr>
<td>• Description of IS Division</td>
</tr>
<tr>
<td>• Y2K Background</td>
</tr>
<tr>
<td>• Initiating Y2K</td>
</tr>
<tr>
<td>2. Media Influence</td>
</tr>
<tr>
<td>• Hype and Expectations</td>
</tr>
<tr>
<td>• Immovable Deadline</td>
</tr>
<tr>
<td>• Y2K Urgency</td>
</tr>
<tr>
<td>3. Relationships</td>
</tr>
<tr>
<td>• Internal</td>
</tr>
<tr>
<td>• External</td>
</tr>
<tr>
<td>1. Other University Departments</td>
</tr>
<tr>
<td>2. Power Grid</td>
</tr>
<tr>
<td>3. Vendors</td>
</tr>
<tr>
<td>4. Trust</td>
</tr>
<tr>
<td>• Trust</td>
</tr>
<tr>
<td>• Cooperation</td>
</tr>
<tr>
<td>5. Complexity</td>
</tr>
<tr>
<td>6. Definition of Outcome</td>
</tr>
<tr>
<td>7. Queries</td>
</tr>
<tr>
<td>• Questions</td>
</tr>
<tr>
<td>• Reflection</td>
</tr>
<tr>
<td>8. Events after Y2K</td>
</tr>
<tr>
<td>9. HR Management</td>
</tr>
<tr>
<td>• Consultants and contract workers</td>
</tr>
<tr>
<td>• Compensation</td>
</tr>
<tr>
<td>• Changes in administration</td>
</tr>
<tr>
<td>• Leadership of Dr. Paul Albert</td>
</tr>
</tbody>
</table>
Context for Learning: Integrated Perspectives within Y2K

The diagram below shows the integration of perspectives that occurred during Y2K.

Figure 2  Integration of perspectives in Y2K

This integration created the context within which individuals in the organization interacted and learned. It contains universal, organization specific and personal perspectives. The universal reflects the Y2K factors that apply generally across the globe – the immovable date change, common methodology, as examples. The organization-specific reflects the particular qualities of the organization that differentiates one organization from the next – its culture, practices, location. The personal perspective belongs to the individual and reflects those qualities that are based on experience and personality, distinguish him or her from all others. It also reflects the context within which the organization learned as the individual members acted as agents of behalf of the organization. It shows how Y2K universal factors were individualized at the organizational and individual levels.

Two approaches: Cleveland Division of Water and Kent IS Division
Following the completion of Y2K in Cleveland, I conducted interviews with involved staff which culminated in several papers (Gustavson and Madey, 2000). It adds depth to review the experiences of both organizations as both responded to the same event; both used a similar methodology, i.e. they used the similar steps to achieve the same goal; both are public organizations. They differ in size, but both organizations covered a broad scope in achieving remediation. Most significantly, each organization responded differently to the outcome of Y2K, and that is the reasons for including this segment in the discussion.

Cleveland took a creative approach to the remediation work of Y2K (Fritz, 1991). The IS Division took a problem solving approach. The differences are in perspective: “what do we want to create” versus “what do we want to fix.” The “what do we want to create” approach gives the employees a goal to achieve. In the case of Cleveland’s Y2K project, the goal was a picture of the organization, running smoothly, optimized, serving customers as usual. Cleveland, following expert advice, believed that any kind of problem, Y2K related or not, surfacing during the Y2K period could be attributed to a Y2K problem. Because of the unknown interdependencies, it was not known what would be affected by error. The solution was to clean everything up, non-human and human. Cleveland made a decision early in 1999 that it would go broad in its assessment to identify any possible issue that could arise and gain attention, particularly from the media, and create wholeness in the organization.

There is a fundamental difference in emphasis between creating and fixing. Robert Fritz, in his books and consulting work, talks about the effect of each approach. Problem-solving, according to Fritz, is taking something away. Creating is bringing something into being. When the motivation to act is the problem, the motivation diminishes as the problem is reduced. (If the motivation is the problem, and solving the problem reduces the problem, it also reduces the source of motivation.) When the desire is to create, motivation increases as
one moves closer to the goal. This increase in motivation arises from the tension produced by
the discrepancy between one’s current position and the desired goal. Argyris (1978) discusses
this in his early book, *Organizational Learning*.

Cleveland employees worked to create an ‘integrated organization’ vision, which
extended beyond fixing equipment into operational and management processes. So when
midnight came on December 31, 1999, and passed without incident, there was rejoicing in
Cleveland. The teams celebrated. They had created their vision: that of a perfectly functioning
organization, providing service that was uninterrupted. Their celebration recognized their
achievement. And the “high” of having done a good job extended to other work projects over
years. The Y2K project became a springboard for another major project, and the enthusiasm
was extended into the new project.

There was a carryover in Kent, also, although effects tended to dissipate when the
outcome of Y2K was defined as a “non-event.” The carryover was trust. It extended into
future work. Dr. Albert’s reports and observations in this case study indicate that trust endured
and was demonstrated by employees in subsequent projects.

It is interesting to note that both Kent State IS Division and Cleveland Division of
Water found the opportunity in the throes of Y2K to examine their organizations. The inquiry
undertaken by Kent to examine the operation of the Division and adopt the recommendations
of the consultants led to an instance of double loop learning (Argyris and Schön, 1978). The
practices of customizing and standardizing were in conflict with each other. After a review or
reflection that included a challenge to the Division’s “theory in use,” the conflict was resolved
with a decision and a change in policy to support standardization.

The increase in compensation for IT workers was another instance of double loop
learning. The university reflected on the wages paid in the commercial sector and on the loss
of IT workers and realized it may not have enough workers to complete the work. This reflection challenged the existing norms for compensation and resolution of conflicting pay norms through the substantial increase in IT salary.

In looking at the learning levels, both organizations share some similarities in their responses to Y2K. Single loop learning occurred in both organizations. Single loop learning occurs when the members of an organization encounter a change in the internal and external environments of the organization which they respond to by correction so as to maintain the organization’s “theory in use.” This correction was reflected in the correction or remediation of the date functions in the programs and the equipment. Organizational members conducted an inquiry, an assessment, through which they discover the source of error and develop strategies to correct it. (Argyris and Shoen, 1978).

Deutero, or second order learning, based on the work of Gregory Bateson, may be called learning to learn. The organization realizes that it must continue its practice of single and double loop learning over time, as a continuous organizational function to compete and improve. Members reflect on earlier contexts for learning. They reflect on past instances of organizational learning and decide what strategies work best. Based on their evaluations of past successes and failures at learning, they create new strategies and encode these in the organizational maps.

Cleveland Division of Water exhibited deutero learning under the conditions of Y2K. The demands of Y2K resulted in the organization opening up to new methods and modes of communication. Employees were given access to the internet for the first time – to contact vendor sites and search for Y2K information, but the Y2K access generalized to other uses. The sectional walls came down and cross functional teams were employed. The creating model was actively taught. New leadership was tapped to help with the burgeoning workload.
Employees felt empowered and involved. They knew how to create results and they wanted more of it. They were able to participate in the deuterol learning cycle. Deutero learning can be applied at two levels, single loop, learning how to correct errors for efficient operations, and double loop, learning to make inquiries that lead to resolving conflicts in performance norms (Argyris and Schön, 1978).

Deutero learning can be identified over time in the IS Division’s follow-on response to increasing compensation as strategy. This had a beneficial effect when it was employed in Y2K to retain, reclaim, and recruit workers. The organization had learned its effectiveness as a strategy. It also learned that skilled workers must be valued. Combining these lessons, the IS Division learned that it must reward valuable workers to retain their services and complete projects. The lesson about reward and retention was applied in a different project area when Banner was implemented. The IS Division built in milestone bonuses for project workers. This was deuterol learning applied at the double loop level.
<table>
<thead>
<tr>
<th></th>
<th>CLEVELAND DIVISION OF WATER</th>
<th>KENT STATE IS DIVISION</th>
</tr>
</thead>
<tbody>
<tr>
<td>Approach</td>
<td>What do we want to create?</td>
<td>What do we need to fix?</td>
</tr>
<tr>
<td></td>
<td>Strategic</td>
<td>Tactical</td>
</tr>
<tr>
<td>Goals</td>
<td>Full service to customers on</td>
<td>Resolve all system problems and avoid disaster to the university</td>
</tr>
<tr>
<td></td>
<td>January 1, 2007</td>
<td></td>
</tr>
<tr>
<td>Vision</td>
<td>Organizational integrity</td>
<td>Rendering each item of hardware, software, and firmware for which the university was responsible capable of accurately processing the data</td>
</tr>
<tr>
<td>Scope</td>
<td>The total organization</td>
<td>Equipment and systems as a subset of the organization.</td>
</tr>
<tr>
<td>Learning</td>
<td>Single loop</td>
<td>Single loop</td>
</tr>
<tr>
<td></td>
<td>Double loop</td>
<td>Double loop</td>
</tr>
<tr>
<td></td>
<td>Deutero</td>
<td>Deutero</td>
</tr>
<tr>
<td>Level</td>
<td>System Level</td>
<td>Component level</td>
</tr>
</tbody>
</table>
CHAPTER SIX

Conclusion

This case study examined organizational learning as a response to the remedial work on programs and hardware that was required by the Y2K date change. The case study was set within Kent State University Information Systems Division. This was a retrospective study based on interview data. The work of Argyris and Schön provides a framework for evaluating learning. The study looked for evidence that learning occurred as a result of activities associated with the Y2K remediation.

The data was analyzed inductively by identifying themes and by creating a chronology of learning events. Interview data provided a context within which to examine incidents of learning. Several themes emerged.

The process of performing the Y2K work was undertaken with a high degree of cooperation by IS employees. Attitudes toward the work were described as positive. However, when the date changed without incident, IS workers felt let down and described Y2K as a non-event. This result prompted an investigation of success definitions. The evaluation of success has evolved from early appraisals of success in terms of outcomes, assets or the project criteria of time, cost and quality, to looking at success as having a life cycle, with opportunities for successful experience in the process leading to the outcome, the outcome, and the period of delivery that follows. Stakeholders are essential to defining success.

An examination of relationships within Y2K showed that IS employees formed no new relationships but worked with existing clients in ways that were deeper and broader. One significant finding that came from the Relationship cluster was the emergence of trust as a
learned behavior in the Y2K experience. Trust, reflected in shared goals and cooperation, facilitated risk taking behavior in carrying out Y2K functions.

During the Y2K process, the administrator of the IS Division requested an organizational review by expert CIOs from other universities. Unsatisfactory performance by the initial Y2K consultant was one of the factors that prompted the review. The team of CIOs recognized a problem with the practice of excessive program modification and recommended standardization. This was another instance of learning in the process.

Topics related to HR Management dominated the results of the study. Most significant were the findings concerning increased compensation for IT workers. The added compensation helped retain and recruit a sufficient number of staff for the Y2K work and represented another instance of learning.

Evidence was found of single and double loop learning as defined by Argyris and Schön which indicates that organizational learning can be a useful approach to understanding the impact of large scale events. Learning effects continued over time suggesting that organizations that consciously manage learning in crisis events can reap long term benefits.

Crisis Management was considered as a rival theory within which to understand organizational response to large scale events. In crises, managers tend to rely on past behaviors. They forego improvisational processes in favor of habitual practices. In crises, the goal is to return to the organizational status quo as soon as possible (Roux-Dufort and Vadaillet, 2003). These behaviors do not advance the organization. Crisis events were considered inappropriate for learning because they were thought to represent one-time events of accidents. This study has shown that organizational learning that is useful to the organization in general operations can arise as a response to a unique event. All three instances of organizational learning in this study have been shown to be effective, as defined
by the organization, in creating new behaviors the serve the organization over time. For these
reasons, the organizational learning approach to framing organizational response in large scale
events defined as crises has the potential for a more positive outcome, giving the organization
new skills or capabilities with which to interact with the environment.

Another important result of the study arose from the immovable deadline that Y2K
represented. Argyris and Schön’s construct of defensive routines applies. Defensive routines
are cover-ups created by organizations and their members to avoid potentially embarrassing
threats. Because the Y2K deadline was absolute, defensive routines could not be employed.
The result was that for the duration of Y2K, organizations were dealing with reality. Stripped
of defensive routines that obscure reality, organizations came together in a common
understanding of reality that allowed widespread success.

Constraints to the Study

There were several factors impinging on conducting the study. One constraint was the
general attitude of the interviewees toward the topic of Y2K. Participants were polite,
cooperative, and willing to talk, but they seemed puzzled that I would want to talk about Y2K.
The consensus among those I interviewed in the Division [and this seemed to reflect that of
most of the IS Division employees] was that Y2K was “much ado about nothing,” a non event.
Because participants gave little significance to the event, it was difficult initially to induce
discussions below a superficial level. Failure to acknowledge the significance of the event
seemed to have little to do with the process of Y2K and everything to do with the outcome.10
When I introduced the topic of Y2K, the general response was, “Why would you want to
spend time talking about something that never happened. Y2K was a non-event.” The level of

10 When Y2K concluded, there were no major ‘happenings.’ The New Year passed without incident. There
was no rioting in the streets due to failed systems. Employees went back to business as usual.
response was increased by asking for specific information about what they did and what they observed.

This response caused me to ponder about reflection -- that unless significant reflection on the meaning of the event occurs, participants may fail to develop recognition of the importance of the event and miss the learning.

There were other constraints. Time was one. The IS Division was entering the implementation phase of a major ERP project, and employees’ time was restricted. The Division was very helpful in providing a pool of names for interviews. I was asked to limit my interview time to that which was essential (we agreed on one hour interviews with the option of a follow-up.) and to schedule my interviews over a longer period of time so that I would not be taking a concentrated number of employees away from work. I was always aware that I was interviewing within a limited timeframe and within limited accessibility.

The constraint that proved most difficult was a prohibition against taping the interviews. I was allowed to take unlimited notes, but not to tape. Having led a Y2K remediation project, I knew the context of the work and methods and procedures that were required to be followed. This helped me formulate questions. Transcribing my notes immediately after the interview helped me gain content.

Application

This research suggests that for application purposes, organizations facing large scale events should deemphasize a crisis approach and begin to frame the situation as a learning opportunity. The key to successful learning is future thinking. Leadership needs to conduct inquiry, asking, how can we do this better, and turn their focus toward the future as soon as possible. Organizational learning has long term benefits. Crisis management and a goal of
returning to the status quo have no future pay-offs. To borrow a biblical example, it is like burying your talents.

The results of learning as a response to Y2K in the IS Division were somewhat paradoxical. Learning was discovered in three areas: standardization, compensation, and trust. Inquiry and reflection, key precursors of learning, were identifiable in the organization’s adoption of standardization and can be inferred by actions to increase compensation. Trust emerged within high levels of cooperation and sharing. In terms of the effects of reflection and inquiry, it is thought that the halting of introspective behavior by the conclusion that Y2K was a non-event could have inhibited learning. This leads the speculation that while learning occurred, more learning could have occurred with greater inquiry or introspection.

A dynamic or systemic view of organizational learning suggests that it is not possible to know with certainty the future impact of current decisions. Learning is a dynamic concept. To restate Lines (2004), “learning …is the outcome of processes that have been developed for and are performed within structures designed for other purposes.” Organizational learning can be unpredictable in surfacing good uses over time. In this research, we see an example in which trust has become a valued part of the organizational culture, e.g. applied in both the Networking Project and now Banner, and the IS Division is taking conscious steps to assure its continuance by securing additional space where workers can better share their work. Future research concerning the dynamic properties of organizational learning as a unit of measure may continue to show benefits.

**Recommendations for Future Research**

**Unit of Analysis**

The dynamic effects of learning in response to Y2K were observed late in the study and came in a conversation with Dr. Albert (personal communication, December 10, 2007).
Recognition of the dynamic nature of learning and the ability of learning to extend in ways that may not be predictable should encourage a non-linear approach. A networked perspective could be employed to better understand the learning impact. It is proposed that this approach be reviewed and the unit of analysis be reexamined and defined dynamically for future research. Also, deutero learning should be considered as one of the dynamic effects.

The Role of HR in Organizational Learning

Results in this study indicate that HR Management has a significant role within the context of learning. Strategic decisions within the employment life cycle as described by Kleimann (2005) can enhance the capacity of the organization to learn. The increased significance given to managing human capital supports the need for HRM to rank high on the research agenda.

Summary

Dr. Leon Kappelman, Director Emeritus, Information Systems Research Center and Fellow, Texas Center for Digital Knowledge, who was also instrumental in orchestrating the federal government’s response to Y2K, described Y2K as “one of the two seminal events that took the Information Age into the third generation.” This study considered the uniqueness of Y2K as a large scale event and its potential impact on organizational learning. Within the limits of this case study, the research found that organizational learning did occur as a result of the IS Division’s response to Y2K. It demonstrated that large events can be an arena for significant organizational learning in one organization. It showed that the effects of learning can endure over time. It suggested that failure to recognize the learning potential can result in lost opportunity. It demonstrated the significant role played by HR Management in the response to Y2K and has implications for the development of the HR role in future organizational learning activities. In the
context of this case study, learning, not crisis management was a more appropriate frame of reference for large scale events and can result in changes that bring long term benefits to the organization. A methodology that considers the occurrence of learning as a unit of analysis was found to be attainable, but more work is needed in this area to capture the dynamic effects of learning. Using Argyris and Schön’s construct of defensive routines, the research further showed that the immoveable deadline of Y2K created a situation in which defensive routines could not be successfully employed. Y2K teams worked to uncover the reality of the situation and the result was global success. This success was realized in organizations of every size and type all over the world.

Since the work of Y2K was duplicated in a fairly consistent manner for all organizations, it is possible that learning effects occurred in all these organizations. Without reflection or inquiry, these effects may remain tacit. However, in applying an organizational learning approach, learning benefits may become explicit and available to the organization for future development.
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October 29, 2004


Methodology used by the IS Division for Achieving Y2K Compliance at Kent State University

The following list describing major tasks performed by the IS Division for the Y2K project was compiled from the interview data:

Table A-1: Major tasks performed by the IS Division for the Y2K project

<table>
<thead>
<tr>
<th>Task</th>
<th>Comments</th>
</tr>
</thead>
<tbody>
<tr>
<td>1. Identification of hardware and software in use at the university</td>
<td>This included everything from Gateway PCs to some esoteric chemistry analyzer. “We included both coding and embedded systems, both hardware and software.”</td>
</tr>
<tr>
<td>2. Creation of a general (wide in scope) inventory</td>
<td>Taking inventory was a key activity. “If you don’t know what you have, you can’t know whether or not you are compliant.” The survey of programs, hardware and software, and detailed. “We went through item by item and asked, ‘Is there any one of you who thinks we can be Y2K compliant without clearing this item?’” A check list was sent out to all of the various departments. It was predetermined that if they were in compliance with defined basic standards, they were probably in compliance overall. Departments were periodically assessed and asked for a report on their progress by checking off what they had achieved. “We would review the sheets and say, ‘looks like you are 50% or 75% done.’”</td>
</tr>
<tr>
<td>3. Assign employees to monitor the systems.</td>
<td></td>
</tr>
<tr>
<td>4. Check vendor websites for information on all listed equipment</td>
<td></td>
</tr>
<tr>
<td>5. Apply one of three general solutions:</td>
<td>The vendor would provide the solution, the IS Division would create a work around, or, a decision was made to cease support for the system if the program or hardware was old and the vendor didn’t support it anymore. One interviewee summed up the potential corrective actions as, “We would replace</td>
</tr>
<tr>
<td>Task</td>
<td>Comments</td>
</tr>
<tr>
<td>---------------------------------------------------------------------</td>
<td>----------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------</td>
</tr>
<tr>
<td>Table continued</td>
<td>it, get new, or live with it.” Dr. Albert was a little more specific and described three general solutions. First, the vendor would provide the solution and compliance would be achieved. Contact with the vendor was made via a website. Several questions were posed at this point: Here are the pieces of equipment. Have we identified the vendor’s website for each? Is the vendor going to fix it? If so, when will the “fix” be released? If it is already released, have we applied it? Did it work? If there were no vendor solution, IS technicians would create a work around in which the program or system would then act as if it were compliant; or, if there were no vendor solutions and the problem could not be circumvented, support for the non-compliant system would be withdrawn, particularly if the program or hardware was old and the vendor no longer supported it.</td>
</tr>
<tr>
<td>6. <em>Simultaneously, perform all work needed to update the technologies underlying the basic applications.</em></td>
<td>While some programmers were correcting applications, others were working on everything under the applications - the Operating Systems (OS), the Databases (DB) and Program Language (PL).</td>
</tr>
<tr>
<td>7. <em>Test all date fields.</em></td>
<td>Testing was another critical activity. Every field that changes had to be tested. “Databases that people write to every day had to be tested, folders and folders just on testing.” One manager states: “In the beginning we started going through applications and going through code. We ran everything and made sure everything was up to date. Almost everything had a 19 in it - payroll, etc. There was enormous testing. Nothing we didn’t test. We contact people in heating plants and in the architect’s office to make sure everyone was on the same page.” Some thought the testing process was originally underestimated.</td>
</tr>
<tr>
<td>8. <em>List all compliance information of the website.</em></td>
<td>All compliance information was catalogued on Kent’s web site which was made available across the university. It was available to all through the internet.</td>
</tr>
</tbody>
</table>


Relationship to the function of the Power Grid

Interviewees stated that they were primarily concerned with the status of the power grid. “The only thing that could affect us was the power grid.” One interviewee had personal contact with a friend at First energy and contacted him frequently. He kept regular contact with First Energy. “Mass chaos would have occurred” if the function of the power grid was disrupted.
APPENDIX B

Originally included with the results section of Reflection, this section on Questions was removed from the body of this document to achieve brevity. It is being reassigned as Appendix B to make information about levels of organizational inquiry available for reference.

Questions

Questions are related to reflections in that they can indicate a challenge to existing organizational maps. I was interested the types of inquiries that were made throughout the Y2K project as an indication of what organizational ideas or beliefs might be challenged. Several categories of questions were identified.

Questions that challenged organizational maps

There were two key questions that determined the direction of the Y2K project. The first was asked by Dr. Albert after he was called to direct the Y2K work. He asked “why were we not using the vendor supplied changes?” Because he could not find a direct answer, he made a decision to apply the vendor changes. That decision set the project on a track for completion. “Then [after the decision to work with SCT], it [the project] just became a big puzzle. We had lots and lots of changes, but nothing very difficult – just sequencing and testing.”

A second key question was posed by Don Tolliver when he asked, “How can we perform better?” and brought in the expert CIOS from other universities to review operations. Although the question had a minimal effect on Y2K, it was generated by poor performance in the Y2K work and the recommendations from this review for customization had long-lasting consequences on the work of the Division.
Questions in the Y2K context

When asked what questions were being asked before, during and after the Y2K project, interviewees mentioned the following:

1. University level questions that dealt with broad issues.
   How was the university preparing for Y2K?
   What was going to happen to payroll?

2. IS Division questions that were fundamental to the work, more specific and focused on the scope of the project, the process, and the technology of creating compliance:
   How much is there to do?
   What are the tasks?
   Who gets assigned?
   Who is going to perform the tasks?
   How will resources be allocated?
   What areas are impacted?
   How many [areas] cross over to other departments?
   How do we do it in seven months?
   What is the schedule?

3. External inquiries that involved vendors and were very specific and detailed. Vendors’ websites were queried to determine:
   Is the equipment listed?
   Were fixes prescribed on the web?
   How was the fix obtained?

Letters were sent to vendors inquiring about how to achieve compliance. Vendors were asked “What needs to be done with this [piece of equipment]?”
4. *System level questions* that were asked by one manager who coordinated the Y2K inventory management, working with Dr. Albert to track departmental inventories. She asked questions such as:

- What are the standards?
- What is compliance?"

Her questions were broad, systemic questions, beyond technology specific questions. This type of question generates learning.
Y2K: An Odyssey in Learning and Change

Sandra Gustavson, College of Business, Kent State University

Call it Y2K. Call it the Millennium Bug. Regardless of the name, it invaded our lives in all directions during the last five years of the century. Now that the crisis is past and the disasters predicted did not occur, as scholars and laymen, we have the opportunity to examine the aftermath of this pervasive phenomenon to determine what really happened. Was there a legacy? What was it?

Y2K has been called the greatest management challenge in history and also the most significant management success. Yet there seems to be a tendency on the part of researchers to dismiss it as a non-event with little real attention to its impact. Perhaps there has been little impact for those that consider it a non-event. However, for at least one organization taking on the Y2K challenge meant complete transformation.

Y2K embodied several characteristics that should have made it worthy of study:
1. It was an event shared world-wide. The threats from Y2K malfunctions had global implications as business among nations would have been impeded should the predicted Y2K malfunctions occur. Nations cooperated and communicated in large-scale projects to assure continued flow of information and work.
2. It caused businesses to shift attention and resources from pursuing markets to Y2K remediation during the pre-millennium period. Resources usually invested in the normal course of business were diverted to activities needed to correct potential Y2K threats.
3. Billions of dollars and man-hours were invested in this work of correction.
4. It was successful. Not only successful, it was successful on a large scale. Since the failure rate of projects is over 50%, and the rate of “challenged” projects, finishing as much as 200% over budget and behind schedule, is about one-third, the success of Y2K is quite remarkable.

Finally, Y2K was a foray into the unknown. The challenges of Y2K required that organizations resolve the unknown and uncertain implications of Y2K through an arduous task of discovery. New methodologies were developed. Organizations’ dependencies on each other were revealed. Y2K teams sorted through the billions of lines of code and examined internal processes, organizational knowledge was gained. Organizations learned about their operations. Communications increased exponentially, within and between borders in order to do the work of Y2K, as information was shared and organizations made discoveries about each other.

Organizations were successful in meeting the Y2K challenges because they learned. Nations had never faced this type of problem before. Y2K was a problem created by technology, but required significant human effort to “fix” it.

During 1999, as Project Director for Cleveland Department of Public Utilities, I participated in a Y2K project to assess and remediate all devices containing embedded systems or ‘chips’ that carried a date function and could cause a malfunction when the date changed to 2000. During that year, I was consumed by the Y2K project and in its course, witnessed profound
organizational transformation. The Y2K ‘bug’ was met and conquered, but more importantly, the whole organization changed in the process. As the year progressed, our work became less and less about Y2K and more and more about what was happening to the organization.

Prior to 1999, the Division of Water was a traditionally organized bureaucracy with a typical “stovepipe” structure. The internal functional walls were impermeable. Group interviews conducted around 1997-1998 as part of a feasibility study to implement a division-wide Information Architecture (IA) showed clearly that employees wanted connectivity. They wanted to be able to talk with each other and share work. However, the rigid organizational structure impeded this. While the signal from staff was clear, there was no immediate hope for change. The IA Project promised connectivity, but its implementation was far in the future. The isolation continued.

The walls between the sister divisions that comprised the Utilities Department were even more rigid. Maintaining turf was the rule.

This paper examines, through narrative, the events of this project and these stages of transformation observed within one organization, the Cleveland Department of Public Utilities. The research represented here presents the Y2K story as data for other others to interpret and draw conclusions. The story of Y2K in the Department of Public Utilities may have been repeated in organizations around the globe.

There is another reason to look at Y2K at this time. We have recently experienced the horrifying events of September 11, 2001. After the shock of that event, organizations brought out the contingency or disaster plans formulated for Y2K. One of the Utilities administrators said, “9-11 was the disaster that never happened in Y2K.”

The Story As Data


Victor Turner, in writing about social dramas, quotes H. White:

[the investigator] “then proceeds to pick out the ‘threads’ that link the event to be explained to different areas of the context. The threads are identified and traced outward, into the circumambient natural and social space within which the event occurred, and both backward in time, in order to determine the ‘origins’ of the event, and forward in time, in order to determine its ‘impact’ and ‘influence’ on subsequent events...” (Turner, 1980, p. 143.)

Turner refers to both “emic” and “etic” approaches to understanding narratives. I was an insider to the Y2K project in Cleveland, familiar with the terms and meanings generally used, and generally responsible for helping create concepts of meaning around the work. In Y2K, meaning was constructed locally by the participants “on the fly.” Meaning was shared as it was created. Referencing Turner, “we have devised numerous specialized genres by means of which we scan, describe, and interpret our behavior toward one another. But the impulse to talk about one another in different ways, in terms of different qualities and levels of mutual consciousness, precedes literacy in all human communities.” (Turner, 1980, p. 146-7)
Storytelling has a place as data in understanding complex social phenomenon. This is only one Y2K story that describes the transformation of an organization from the static and traditional to a dynamic learning organization.

Y2K in Cleveland’s Utilities Department

Within the City of Cleveland, the Department of Public Utilities, is a self-supporting entity. It includes water, municipal electric power, wastewater and fiscal services. Although the entire Department of Public Utilities is affected, much of the action of this story focuses on events within the Cleveland Division of Water where the most aggressive Y2K remediation activity occurred. However, Y2K resulted in success for all Utilities services.

The Cleveland Division of Water serves over 1.5 million customers, in 70 communities in northeast Ohio. It maintains over 5,000 miles of water mains and pumps 38,000 gallons of water per day though 5 production and storage facilities and 32 secondary pumping stations and towers. The Cleveland Division of Water is the one of the largest water facility in the US. Were water processing facilities to fail over 1.5 million residents would be without water.

There were two major thrusts of the Y2K work within the Utilities Department: business applications requiring coding correction, and the embedded systems, or ‘chips,’ which were thought to be present in the water processing and power switching systems. The responsibility for the correction of lines of erroneous date codes within the Department of Public Utilities business applications was contracted out to a national software consultant as part of a city-wide remediation effort. Local staff had little input into the actual coding remediation. However, handling the threat of Y2K problems within the embedded systems defaulted to the Utilities Department and became an internal project. It is the subject of this paper, and it happened this way:

January, 1999

In January, 1999, the City’s Y2K consultant for software requested a signoff for the Y2K code corrections to the business systems. When city administrators examined the work descriptions on the sign-off sheets, it was apparent that the water processing equipment known to have embedded date functions had been excluded from the consultant’s Y2K survey. Power switching equipment also was absent from the list. Utility officials were shocked. In January, 1999, less than 12 months prior to the date change, the Cleveland Division of Water was sure it could bill customers for water because the business applications had been corrected, but had no guarantees that it could produce water. Date functions embedded in automated processing equipment had not been identified or assessed. Cleveland Public Power, the municipal provider of electric power within the city, faced the same circumstances. Lines of code and the billing had been the sole focus of the consultant’s Y2K efforts, and the billing function was close to being remediated. But the huge undertaking of examining embedded systems in processing and power switching equipment remained untouched. Less than 12 months remained until the date changed. Panic ensued.

Use of In-house Resources

Several decisions were made: first, the department would use an in-house team to assess the power and water equipment. There was no time to contract out the work, and most consultants were committed to current customers and unable to take on additional work. Second, the Y2K
effort for the remediation of embedded systems would be done as a department-wide effort. The four major divisions, Water, Power, Water Pollution Control, and Fiscal Control would be joined in a single effort to examine and correct any possible Y2K threats. Later, the city-wide radio system and city-sponsored TV cable system were added to the project. This decision allowed the sharing of resources and would create a standard approach to Y2K remediation that would help insure the validity of the results.

The decision to create a joint effort among the divisions was notable in light of the traditional “stovepipe” structure and turf issues. While a joint effort was undertaken, there were varying levels of participation from the four divisions of the DPU. The Division of Water participated at a higher level and provided leadership for the other members. Cleveland Public Power (CPP) was a reluctant participant and gave minimal compliance. CPP was engaged in other high-priority activities in the city that had fixed deadlines. Like Y2K, the building of the Cleveland Browns Stadium was another high priority city project. After a hard-fought battle to retain an NFL team, the Mayor had promised a newly built stadium would open in August, 1999 without fail. Opening the Stadium depended on the completion of CPP’s electrical work. Water Pollution Control and Fiscal Control saw their potential Y2K problems as minimal and therefore engaged the project only when compliance was demanded by higher administration.

A new assistant Director for DPU led the way. George Crombie was guided in his experience by earlier participation in a Y2K project in another state, and he knew what not to do. His directive set the stage for all later activity. CWD’s assistant commissioner for Budget and ITS was the project’s Executive Sponsor and ultimately reported to City Administration for the outcome. The project was directed by an experienced Project Manager who was also an instructor in Project Management for the Division. Later, a deputy PM was added. These four managers formed the administrative team. Before the project was completed, over two-hundred DPU employees would participate.

From the outset, there was no intent to change the organization. The Department of Public Utilities was an organization faced with a challenge that needed to be resolved. However, during the course of the year long project, massive organizational change would occur. The urgency of Y2K forced the change, and, according to Utilities Administration, changed the culture of the Department. This is the story from the point of view of the author, the Project Manager who helped lead the odyssey for change.

The Y2K Project: the Approach

It is important to note that the approach taken from the outset was not problem-solving or crisis management, the approach most accepted by management. George Crombie gave the project its directive: all systems fully operational after midnight on December 31, 1999. It was a specific end result to be attained. The differences in approach lie in the motivating or driving force. Taking action to bring a result into being is different from taking action to make something go away. If you take action to make something go away the end result is the absence of something. If action is taken to bring something into being, the result is the presence of something. Example: In demolition, a building is removed. In architecture, a building is created. Robert Fritz (1989) uses the words problem solving and creating, respectively, for these actions. Getting rid of difficulties is the most common understanding of problem solving. However, in mathematics and engineering, problem solving actually creates a result: an answer to a set of numbers or a new technology. Following Robert Fritz’s structural approach to creating, the motivation of the project was to bring a defined end result into existence.
A vision or goal was set by the question, What do we want to create in this Y2K project? The answer, articulated by the Assistant Director of Utilities: An organization that is functioning perfectly as the date changes and after, no glitches, no problems, just perfect function, with the customers receiving high quality, compliant water, and uninterrupted power and sewer services.” This vision drove the process. We envisioned and defined everything that was included in that end result - flawless operations. George Crombie’s directive was a fit for Fritz’s structural model, and the constructive approach expanded the scope of the project in several ways:

1. Any problem that might co-exist with a Y2K issue had to be eliminated. The intent was to eradicate any issues that could complicate or compete with a Y2K problem. It was clear that if we wanted to maintain normal operations as our desired end result, we had to uncover everything that could possibly threaten that condition, from Y2K or any other causes. We looked at everything that could possibly hamper the successful operation of water and power production and delivery. For example, computer systems are interactive and a glitch in one can domino into other dependent systems. This meant tracking systems and inventorying equipment, testing networks and network dependencies, giving the team a clear field to understand and address any potential Y2K anomaly, eliminating any other equipment-related problems so that Y2K issues would not be obscured.

2. It also meant streamlining any management issues that were restrictive and could possibly complicate a response to a Y2K problem. Heading the list of management issues were “organizational stovepipes.” They had to go. We needed clear and rapid communication to achieve the goal. Information had to flow quickly, unimpeded. As we created communication networks to allow information to flow through the organization, the silos would become vestigial.

3. Preventative activities were undertaken, for example, scheduling the regular maintenance on the heavy water processing equipment early to correct any mechanical defects due to wear.

4. Contingency plans had to be prepared to handle any unforeseen events. We would need to create alternatives that could maintain production should normal operations fail.

To achieve the vision, “fully functional and operational....” any possible threat to operational integrity had to be identified and eliminated, Y2K related or not. By now, it was public knowledge that any problem occurring on New Year’s Eve would be attributed to Y2K and could be a cause for potential panic.

Visualization drove the process. We resisted the urge to become process-oriented, driven by “to do” lists. Instead, we kept the focus on the end result. All activities in the project were measured against their contribution to the end result.

Fritz Structural Model

There are four major components to Fritz’s (1989) structural model: (1) A description of the end results, defined so clearly that its achievement can be measured or validated. The end-result is a destination. (2) A clear and honest statement of the current conditions or “current reality, with respect to the end result.” We had to determine the status of the organization in terms of achieving the end result. What did we really know to be true about the equipment and processes in the Department of Public Utilities? The model is driven by recognition of the disparity between the current conditions and the end result. According to Fritz, this disparity creates structural tension which prompts the current conditions to be resolved toward the end result by performing (3) carefully chosen, relevant activities, the third component, designed to bring the end result into existence. (4) Forces in play are the influences for better or worse that can impact achievement of the end result. In the case of Y2K, the strongest influence was Time. It was immovable. All work had to be completed before the December 31 date change. Another key
influence was uncertainly. There were no prototypes for Y2K. If we were to be successful, we
needed to reduce the uncertainty. Further, tasks had to be performed in a manner that was legally
defensible.

_A Y2K Chronicle_

The first activities in the project were to form a working team and benchmark. There
wasn’t time to create a new methodology. We looked for prototypes. Team members generated
specific methodologies for each task in the project. We looked for best practices from
organizations more advanced in their work than we were. Consultants also provided some
information, but web searches were instrumental in helping us gain information. Material
available from professional organizations was downloaded as we conducted an aggressive search
for information about Y2K activity world-wide. Searching the web helped us realize that we were
part of a global initiative, and that as we were working, so were others in countries across the
globe, all working toward the same end. Using accepted methodologies helped us achieve due
diligence.

The information provided on line by the State of California on embedded systems was
most helpful. Well documented, it provided the initial methodological framework around which
our activity was organized. Written methodologies were created for each activity, assuring
standardization of best practices.

Leading in the first team meetings felt like sitting among the rocks at Stonehedge. Team
members sat like stones, inorganic, unaware, dumb to what was needed. It was clear that the first
priority was to learn, and learn as fast as possible. We quickly used technology to enable learning
tools. Connectivity was established among all team members through local network email, and
key members were given access to the web. (The web was a closely guarded resource within this
public organization. Few had access. By the end of the project, all had access.) The water
treatment plants were connected to the rest of the organization by network for the first time.
Learning became a key charge and challenge, especially during those first months; sharing
information was both encouraged and required. In retrospect, this was probably the first ever
instance of learning as a dominant force in the organization.

Team members were chosen from those who had the requisite skills: Project
Management, systems analysis, data entry, engineering expertise, plant management. But no one
had tackled this type of systems problem before. Since Y2K was a unique event, most of the
knowledge available was speculative. Part of the performing a task was learning it and then
becoming an expert. The team needed to develop the requisite expertise within and create a body
of knowledge that would convert the unknown to the knowable, tacit to explicit, so that it could
be shared.

The first task of the team was to conduct an inventory of all equipment within the
department that could potentially contain embedded systems. This was part of defining the
“current reality” of the project. First we had to know what an “embedded system” was. The
definition was constructed from multiple sources; most were web-based. The team created a data
collection instrument, and teams of representatives from every section within the Department
conducted the inventory. The strategy: to inventory broadly and refine later. During this step of
the project, over 6,000 pieces of equipment were catalogued.

We needed a repository for the information. The teams were not confident using the
database the software consultant had developed for business systems, considering it full of errors
and deficient. Instead, we developed our own database to collect all Y2K data related to Utilities’
embedded systems. Items in the consultant’s database were retained so that they could be later linked, if that proved necessary.

As the inventory drew to a close, the other steps emerged. There was a clear transition in the project at this point. Once the inventory was completed, team members with different skills were needed. The shift was reflected in the type of participation required. The first team, charged with conducting the inventory, knew the location of all the equipment and could help us create a comprehensive list of equipment that needed to be examined. In the second phase that took us to the close of the project required team members with specific skills that could help us assess the status of the equipment and lead the more technical corrective tasks that loomed ahead.

By the beginning of the second phase, we had defined the basic project activities that were required. They were

1. Inventory
2. Data base creation
3. Data Entry
4. Risk Assessment
5. Assessment of equipment for Y2K components
6. Contingency planning
7. Testing of equipment
8. Remediation of non-compliant equipment
9. Public and employee education

Several of these activities occurred concurrently, as the team moved out in parallel coverage. Subteams were created for each major task area, each with its own leadership. The project established strict timelines. Project success was based on identifying tasks from holding the vision of the end result and comparing it to the current state and from adhering to the schedule.

Another decision contributed significantly to achieving project goals. We decided to work throughout the project in large groups. Our contingency planning group exceeded 50 members. We needed to educate and inform as well as gather input. Over 200 persons took part in project activities from the start to the close. The purpose of broad involvement was twofold: to increase the number of “hands on deck” to help with the work and simultaneously to educate members of the division about the importance of achieve compliance and the impact of failure if we did not. More hands, more eyes, more experience, more knowledge to apply to goal achievement were our hedge against the unknown.

The teams expanded through a “cascading leadership” model featuring “leaders of leaders.” The team leaders in the core group chose the participants at the next level down. And that level of participants chose the next level. And so on. The sub teams were linked (Likert) and work passed up and down and through the leadership network. Direct communication was allowed from any point in the network. Everyone served as a leader at one time in the project. The traditional “chain of command” would have impeded progress, and we needed methods to accelerate the work and increase shared knowledge.

Team members worked tirelessly, extended hours, for months. The short term goal: to have all equipment located, identified and assessed by the end of May, 1999. It is hard to describe the motivation for this work, perhaps the challenge, perhaps the opportunity to learn, to be part of something of great import, to work closely with others, but everyone on the team kept up the drive to achieve the goals. We were truly working Fritz’s structural tension model. Team members knew their destination (end result); they knew their current location (current reality). They had only to complete the path. Structural tension (Fritz, 1989) existed between the end result and the current reality of the project. The tension held by the teams resolved upward until it became the desired end result.
New goals were set as information was uncovered and understanding of the problem increased; detail was added to the vision. This methodology is called a “rolling window.” Near time tasks are defined in detail while those further out are less well defined. As more and more detail is accumulated in the present, it is used to plan detail further and further out. Work was conducted to the highest level of detail possible. Each task was highly refined to create a fine net through which no problem could escape.

It should be noted that working from a vision of the end result was “digital” or non-linear compared to the analog or linear approach of typical process-oriented “to do” lists. Imagination as well as visualization was used as a tool throughout the project. We constructed charts of equipment systems with pictures of how they function and interact. Contingency planning was accomplished by picturing, through imagination. Using visualization, we were able to grasp and address more detail in potential outcomes.

Learning

Learning was a key theme throughout the project; the learning goals were internal and external. Included were education of the team, employees, other city agencies, and education of the public. Specifically, we had to learn about the individual pieces of equipment, how they were functionally related, the relationships between Utilities functions and those of suppliers, chemical suppliers and upstream power providers, as examples, and customers, residential, industrial, medical, and all internal processes related to management as well as water and power production.

Although the team believed from the beginning that community education was needed to avoid panic and increase preparedness, the task of conducting public education came late in the project. The Utilities Department was governed in matters of disclosure by city policy and City Administration distrusted public reaction, therefore, an educational response to the public was delayed. The distrust was encouraged by city legal teams and a long-standing city tradition to say as little as possible. Once community outreach was approved, the Y2K team expanded again, specifically to direct internal education of employees and to respond to all public invitations for informational presentations.

The education sub-team conducted focus groups across the department to create the best design for employee training. The results of the focus groups were startling. Providing the opportunity for employees to talk was like opening a pressure valve. Concerns exploded from employees and ranged from personal issues, such as what they needed to protect their homes and families, to work related issues - would they get paid, what had been done to assure they would get paid, would they be required to work on New Year’s Eve. Learning was translated to mean communication, in every direction, horizontally, vertically, up and down the organization. All committees and meetings were open to self-elected participation.

In addition to understanding the equipment in operation, the team also wanted to know who its organizational members were. The telephone lists were outdated, so new, updated lists, which included all employees with an easy to read format, were created and made available on a network server for all. The education committee published internal newsletters and developed pamphlets which were later adapted for city-wide use.

The project team was rewarded when our methodology was recognized by city administration for its excellence and accepted as the city-wide model. The DPU had been established as the clear leader for Y2K activity across the city. Following the our lead, the city effort, which was initially superficial and only represented a pass at reviewing city systems, shifted to an in-depth approach, demanding closer scrutiny, quality performance, and tighter timelines for compliance.
We needed knowledge of management processes to determine their viability in the new context of Y2K compliance. Management practices were challenged if they appeared to obstruct the flow of communication needed to assure compliance.

Education was mostly summer’s work. The May 31st goal to complete the equipment status report had been achieved with all equipment identified, compliance status verified through manufacturer’s contacts, and all major equipment pieces tested. It was a surprise that only a few pieces of equipment needed to be replaced. However, equipment with defective date codes would have caused significant malfunctions in processing had it not been replaced.

In the fall of 1999, the education team made a video for cable TV and other public showings. It conveyed the City’s Y2K statement to the community. No one on the team had any experience that would help them accomplish this task, however, together they learned what needed to be done, brought in some outside expertise, and created a credible product within very short turn around time. This was repeated many times throughout the project.

Contingency Plans

In June, contingency plan drills began in the water treatment plants. Plans targeted the vulnerabilities that were defined in earlier group sessions. Crews practiced shutting off automated devices and producing water using manually operated equipment and overrides. With the tasks of drills and contingency, the net was widened and more staff participated. We gathered more intelligence concerning the effect of equipment failure and learned more about what needed to be done to continue operation or minimize damage. Contingency planning brought together the largest planning group in the history of the organization. Over 50 people met in four all day sessions during a two month period. This exercise was one of the most significant experiences for participants. They valued coming together is a group to discuss and generate ideas.

Transformation

As the project took shape and tightened its focus, the contrast from those early meetings was remarkable. The teams became knowledgeable, organic. A dynamic intelligence could be observed among team members. The group became as a collective brain that absorbed and processed and gave out information. We understood clearly what the term ‘Learning Organization’ meant, because we had watched it evolve first hand.

One tragic event marked our effort. The lead electrical engineer who was key to the design of the testing plan, the architect of the compliance methodology, who reviewed all equipment status, a young man, barely 40, passed on September 1, 1999 from a massive heart attack. It was a personal loss as well as a loss to the team. No one was qualified as his replacement; no one had his expertise or newly gained knowledge of the Y2K aspects of the system. Other engineers who had some knowledge of the project were brought in, but there was an emptiness that to the end of the project was not healed.

Working In Detail Produces Results

The teams approach was to be as thorough as possible. This supported the due diligence requirement. For example, when systems were tested, all functions were stressed. One important test involved the emergency power generation at Water’s headquarters facility. The IT managers opposed this testing, calling it unnecessary because the generator was newly installed and had been checked after installation. But the team standard was to conduct an aggressive test, so we
went forward with the test, simulating conditions that would occur with an extended power outage. The newly assigned electrical engineer was in charge. He climbed right on board and designed a rigorous, point by point test. The results: the emergency generation system failed after only 1.5 hours of operation due to faulty wiring in the ventilation. While the test was being conducted, several key IT systems were discovered not to be wired to emergency generation and ceased functioning. Lighting throughout the facility was inadequate under emergency power. Expired and spent batteries were discovered and replaced, and switchgear which had not been attended to for years was cleaned. All systems attached to emergency power were verified and drawings updated, creating a valid knowledge base for reference in an emergency.

The New Year Approaches

Additional staff members were needed for duty New Year’s Eve. Initially, the projected numbers of auxiliary staff were large, double and triple the regular staffing for such a night. However, as the date drew near, we gained confidence that much of the situation was now known and that the equipment would not fail in its production of water. The result was lowering the number of necessary staff. By the end of December, staffing was not much more than would be usual for a holiday.

All staff members were scheduled to be on duty during the days between Christmas and New Year’s Day. We used this an opportunity to put our work to the test by scheduling a department-wide table top drill - a simulation of emergency events in which participants, staying together in the room “at the table,” responded to a series of postulated events as if they were real. All who were invited participated: over 60 participants from all divisions of Utilities, representatives from city administration and county emergency services. All levels of the organization were represented. This experience was simply amazing. There was new commitment to optimization within the organization. Participation was sincere and enthusiastic. At the conclusion, all agreed it was highly productive and one of the best events ever planned. The team and the organization were now one.

The team worked until the last minute, checking, listing, practicing. On December 31, optimism grew as each time zone passed into the millennium without incident. At midnight in Cleveland, the response was quiet relief. The lights stayed on and water kept flowing. The team was too tired for raucous celebrating, but gratitude was expressed. And recognition of having shared a moment in history.

Y2K Endures

There are visible remains of the Y2K effort: a database of over 6,000 pieces of equipment, an updated contact list of all employees that is shared, written contingency plans, several replaced and tested processing systems that provide improved operations for the Department, and a legacy of having worked together as a team to accomplish a monumental task, challenging the unknown and prevailing.

During the year of Y2K remediation work, the team touched every part of the organization at every level. Deficiencies in equipment systems and in managerial processes were corrected to create greater efficiencies. Employees who had not worked together before were brought together in cross-functional teams. Water treatment plant personnel who had been left out of the communication flow were connected to the network and could communicate with the rest of the organization through email. Employees were given access to resources and empowered to undertake those activities that would exacerbate Y2K failures. The organization was changed.
had a new trimness. A new integration, a meshing of people and functions. It had been cleaned up
and fixed up. New leaders emerged. New skills were learned and old skills were enhanced.

Epilogue

This story does not stop with the entrance into the millennium. Immediately after the
Y2K project, in early January, 2000, Utilities began the implementation of a $20 million
department-wide Information Architecture (IA) project. The same approach that drove the Y2K
project is now being used for the IA project. The first step in this project was to teach the many
“thread leaders” who would be responsible for 17 sub-projects Fritz’s structural creating process.
Unlike the Y2K project, this project was supported by an external consultant. However, by using
a structural framework internally with a Project Management methodology, the Department
created a clear definition of the scope and is maintaining control over the results of the high-
impact project. Through the work of the project, the massive learning continues. The Executive
Sponsor for Y2K continued on with the IA project. He reports that the culture has changed.
Employees hold a systems 1991pective, seeing the Utilities organization as a whole, as they were
forced to do through Y2K activities. No more silos. There is the pervasive attitude, “I can do
more,” that spilled over from Y2K to the IA project, and employees are still doing more. Those
not challenged are now feeling left out.

The IA Project provided a “next step,” a new focus after the Y2K work. Perhaps the
impact of Y2K was heightened in those organizations that had a place to go, a next step after
Y2K. Perhaps Y2K was dismissed as a non event in those organizations that didn’t.

Conclusion

The purposes of this paper was to present the Y2K story as data showing the
transformation of one organization performing typical activities for Y2K remediation over the
period of one year. Several changes occurred in the organization:
1. Cross functional teams were used extensively. During the course of the project, cross
functional teams became the rule for other non-Y2K projects as well.
2. Prior to Y2K, the organization was locked in silos. Employees were aware only of what
happened in their sector. During Y2K employees were connected to each other through networks;
they could share information on a server. Cross functional teams created the venue for new
acquaintances.
3. The Y2K work required that employees become aware, or “mindful,” of the entire organization
and how each part contributed to doing the business of the organization. The organization
developed a systems perspective.
4. New leadership emerged. Out of necessity, employees buried at the bottom of the silos
emerged, and new talent was recognized. This talent was utilized in subsequent projects with
positive results.
5. The culture shifted to favor learning and doing. The new action-oriented style has pervaded the
organization.
6. Connectivity extended outside the organization through the introduction of the Internet as a
work tool and the organization developed a world view.

Some real practical benefits of Y2K accrued to the Department of Public Utilities from
the Y2K project. At least $1 million was saved by doing the project in-house. Consultant services
would have cost over $1 million; the project was accomplished internally for about $127,000.
Another benefit: all the learning was retained by the organization and is now being utilized in other projects and generally in the work of the organization.

One final word about the teams. 1. They were empowered to take action, and, 2. they were given the resources needed for their work, and 3. their goal was clear. Team members could make a decision about whether or not they wanted to commit to the goal. The teams articulated the need for each other, for expertise, for support, as a hand in the labor. Competition was distinctly absent and cooperation took its place.

It seems that we are overlooking an important lesson if we dismiss Y2K as a non-event. Through Y2K, the world learned success. Reason dictates that the results at the Cleveland Department of Public Utilities cannot be singular. Millions of organizations repeated the same set of activities. Yet we have little data on the impact of Y2K on organizations.

Now we are faced with the aftermath of September 11, 2001. It has many of the Y2K characteristics. Will we dismiss it again as crisis management, returning to business as usual as the fear subsides. Or can we capture the lessons as use them to support change, to support learning, and take the next step.

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