The Continued Challenge of Y2K: What Can We Learn?

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The Continued Challenge of Y2k: What Can We Learn

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Abstract
The Year 2000 (Y2K) brought numerous challenges 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 remediation work, corrections were made and the millennium date changed without incident. Y2K remediation was a declared a powerful example of success by Y2K team leaders throughout the world. This is an exploratory study that begins to examine the impact of Y2K remediation projects at the local level through a case study approach using narrative analysis. The results of the study suggests that models of learning theory, knowledge creation, complexity and action research/learning can be applied to understanding the Y2K phenomenon. Learning organization model implies organizational change.

Introduction
On March 8, 2000, a group looking to recover the basic lessons of the Y2K experience convened in Washington, DC, to review the findings in a report called the “The Many Silver Linings of Y2K Challenges” and to examine possible future directions for employing lessons learned in Y2K for future gain. The findings were:
1. The immovable Y2K deadline of December 31, 1999 caused leaders to target technology management issues and created an awareness of technology which will endure.
2. New relationships and new levels of cooperation will enable aggressive joint initiatives in the future.
3. Government lists of computer data exchanges among private sector, federal, state and local governments can be used to support future large scale joint initiatives. (Mc Donough, 2000)

One government official said, “We realized so many other benefits, that being ready for Y2K seems more like the secondary reason now.” (Foltz, 2000) Other high ranking officials called Y2K the greatest management challenge in the history of the world. (Koskinen, 2000)

As stories are now being gathered about the millennium event, it is important to begin to put a framework around the Y2K experience. Y2K represents large scale success. What can we learn from it for future action? What can we apply to future challenges and management problems? What has Y2K taught about how work more effectively? How can we recreate the Y2K success?

Y2K remediation projects represent billions of dollars well-spent by government and private industry globally to prevent a wide-spread technology failures. This alone makes the Y2K phenomenon worthy of study. Beyond the expense, 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 world wide. (Peterson, et al, 1998, Wheatley, 1998) There were predictions of world-wide depression and disruption of all major systems: health care, utilities, governments, transportation, as examples (Wheatley, 1998). Litigation was a risk. Y2K remediation teams were highly motivated by a fear of drastic consequences. Litigation fears resulted in detailed documentation, a legacy of data for study. The Intergovernmental Advisory Board and its affiliates have begun gathering data with the “Silver Linings” report. Each one of the millions of ‘experts’ involved in Y2K remediation work in private and public enterprises, at the federal, state and local levels, each of these Y2K veterans, has a story, all part of the Y2K legacy.

Y2K was a remarkable human endeavor, remarkable because of its success, because of the human capital it mobilized, because of its tremendous cost in dollars and time. For years prior to Y2K, businesses shifted focus from productivity to Y2K prevention. We have advanced into the year 2000. None of the dire predictions has occurred, but the challenge of Y2K remains -- to capture the lessons that will allow us to repeat the Y2K success.

It is the intent of this research to add to the growing body of knowledge about Y2K by examining data from the Y2K remediation experience in the City of Cleveland Department of Public Utilities where Y2K issues threatened the continued production of water and provision of municipal power to local residents. The lead author was Project Manager for the embedded systems remediation. There were indications that Y2K had impact on the organization. The authors endeavor to explore and understand the nature of that impact using a grounded theory approach and narrative analysis. The paper will examine interview data from an initial sample of Y2K project participants (Lee, 1999). Then, the study will draw
from existing literature to begin to develop a theoretic frame work.

Y2K is a novel phenomenon, and therefore there is little specific data published to date describing its impact on organizations. Data from the Society for Information Management (SIM) reported in 1999 showed an increase in the functional areas and divisions working together from 1997 to 1999 based on surveys of IT executives working on Y2K (Kappelman, 1999). Increases in contacts with customers and suppliers increased as well. Other data points to an increase in standardization related to Y2K compliance. (Kappelman, 1999)

There are several theoretical models that could have relevance for the Y2K phenomenon have been selected for discussion here: learning theory and organizational learning (Senge, 1993, 1998, Wilhelm, 1999, Schein, 1995), organizational transformation or change, and knowledge creation (Nonaka, 1991). Action learning, popular approach to “producing innovative solutions for organizational problems and for developing management talent,” (York, 2000) offers much as a conceptual framework for understanding the Y2K remediation. While case data has been collected on learning organizations and organization theory, the field is lacking specific application to Y2K endeavors. The uniqueness of the Y2K phenomenon suggests a need to begin at the roots and describe Y2K impact independent of previously studies before attempting to fit Y2K events with existing theory. What can Y2K remediation offer in terms of new learning or confirmation or illumination of already existing theory?

Methodology

The purpose of this study was to elicit statements of meaning from those who had participated deeply in the Y2K remediation to begin to understand the impact on an existing organization. Completely unstructured interviews were chosen as a method for initial data gathering (Lee, 1999). Constructed questionnaires may limit the range of responses. (Riessman, 1993). There were no pre-selected topics. Less structure to the interview gave control of the content to the participants (Riessman, 1993). This supported an exploratory intent, in that narratives, getting the stories out, would provide the best opportunity for understanding. An initial sample of eight participants, selected to represent all levels of the organizations were interviewed in February and March, 2000 and were asked to describe what they found notable about the Y2K experience. How was it like or different from other work experiences? Other questions were based on the content of the interview. The unstructured conversational format has been shown to be more useful in generating theory. (Lee, 1999). Open-ended questions allowed the participant’s beliefs about what was important emerge. All interviews were recorded and transcribed.

The narratives were analyzed to identify themes, both within individual responses and common to group. Several themes were identified (See Table 1) and considered in terms of current theory; specifically: action learning, learning organizations, organizational change and knowledge creation.

Description of the Project

In January, 1999, the City of Cleveland Department of Public Utilities undertook a massive project to assess the Y2K status of its ancillary devices, which included the controllers on water plant processing equipment and electrical power distribution devices. Potential Y2K failures involving these devices would result in serious disruption of utilities service. A year and a half before, the department contracted for the remediation of business systems (coding). However, little attention was given to the problem of embedded systems. In January, 1999, with less than a year to go before the millennium date change, the Department assembled a core team to begin an assessment and remediation effort for equipment in 5 water treatment plants, 17 secondary substations and towers, and numerous electrical switching stations. The team performed standard functions to insure Y2K compliance: conduct an inventory, create a database, determine compliance, test equipment, assess risk, develop contingency, remediate all non compliant devices. Before the effort would be complete, more than 200 people from all parts of the organization and all levels were involved, 6,000 pieces of processing equipment assessed and many tested. The project was lead by a senior Utilities Department official, a high-ranking Project Sponsor, a Project Manager, and Deputy.

A systems model was articulated throughout the project. On December 31, 1999, at midnight, the date changed to the year 2000, and no Y2K related failures or events were recorded.

Results of Interviews

Table 1 represents a summary of themes extracted from interview data. These are listed with the author’s comments and some direct quotes from participants to further define the themes. Theoretical models relating to the themes are proposed.
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<th>Theme</th>
<th>Comments</th>
<th>Theoretical Implication</th>
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<tr>
<td>1. Coming together as a whole department</td>
<td>Working together as a whole organization - water, power, and sewer services, all divisions, helping each other to achieve one goal. Teams were cross-functional, and broke through the “silos” that had been in place for as long as anyone in the organization could remember. “We learned we could work together as a team to accomplish higher, larger goals.”</td>
<td>Knowledge creating (Wheatley, 1994) When people who have not worked together before are brought together, new information is created. Action learning (Marquardt, 1999) In rapidly changing environment, acting and learning must be concurrent. Key approach to development at individual, team and organizational levels. Used by major corporations. Can be applied simultaneously to: problem solving, organizational learning, team building, leadership development, and professional growth and development, the “five most important needs facing organizations today.” Linked to teaming and knowledge management.</td>
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<td>2. Interdependent for information; using the group as a resource</td>
<td>Relationships were formed among those who had not worked with each other before. Because team members were called upon to perform outside their normal range of skills, they asked others in the group for help. “We felt that if there was a weak link, we could rally ‘round and support that weak link so that everyone stayed up to speed.”</td>
<td>Knowledge creating (Nonaka, 1991) Individual know-how shared with others is core to the knowledge sharing company. Action learning (York, 2000) Action learning can build on tacit knowledge by formalizing it into experience and making to more conscious and directed. (Staint-Onge, 1999) Tacit knowledge influences leaders perceptions of industry and the firm’s place; it is key in decision-making. Learning organization (Barker and Camarata, 1998) Learning organizations are formed through rich relationships enabled by communication.</td>
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<td>3. The team represented expanded knowledge</td>
<td>Team members learned from each other and learned from external sources. The internet, used broadly for the first time in the organization, was key to aiding learning. The knowledge of each individual expanded as each participated in group learning. Teams were diverse in terms of skill and experience.</td>
<td>Knowledge creating - a company is not mechanical, but organic, with a shared identity and common basic purpose. (Nonaka, 1991) Creating knowledge is a social process, advanced through “action, interaction, and reflection.” (Hedström, 1998) (Carayannis, 1998) Role of learning in leveraging information technologies</td>
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<td>4. Involving others had a ripple effect, to the “second and third tiers.”</td>
<td>Sub-team leaders often chose sub-team members, and the net of expertise widened. “When you chose one person, you influenced the next tier of work. First level experts chose next level experts and the net of expertise was passed on and widened.”</td>
<td>Complexity, organizational change and knowledge management. (Halal, 1999)”1. Complexity requires internal enterprise, 2. Cooperation is economically efficient, 3. Progress flows out of knowledge and spirit.”</td>
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<td>5. Involvement of large numbers of people produced new leaders</td>
<td>New leaders emerged, existing leaders expanded their scope of influence and learned new skills; commitment was broad; the resource base was expanded; learning was transferred broadly. Ownership of the project was shared. The project model became “leaders of leaders.” One manager observed, “People in this organization never had the opportunity to excel. They were afraid to make mistakes and had no freedom to be creative.”</td>
<td>Leadership and complexity (Bennis, 1998) Leaders must deploy the learning capability of their people, as individuals and as a group. “Leaders of Leaders,” rather than “leaders of followers.” Effective leaders and followers have the same characteristics. (Stewart, 1998) Leadership enhances optimal utilization of IT.</td>
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<td>team approach transfers to other tasks</td>
<td>several businesses and closed down traffic in the affected area for days. The repairs were conducted under great pressure for timely completion. The repair project employed the cross-functional team approach, reaching across several departments in the city, including other utilities, and seemed to come quite naturally after the department-wide Y2K success. Project Management methods were used.</td>
<td>in application. Knowledge management (Carayannis, 1998) Role of learning in leveraging information technologies. Program Management useful for managing higher levels of “complexity, uncertainty, and interdependency.” (Nevis, et al. ) Learning is described as occurring at a systems level, because it is retained by the organization though individuals may come/go. Learning organization (Carayannis, 1999) According to Doz (1996), Distinction between cognitive and behavioral learning: the first occurs when there is a realization that change is needed. Behavioral learning occurs with implementation. Organizational learning re reflected in new behavior across the organization. (also Teece, et al, 1997)</td>
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<td>7. Importance of setting a clear goal</td>
<td>Setting a target for what we want to accomplish; set out steps to achievement. “Be clear about what the goals are so people can feel good about what they want to accomplish.”</td>
<td>Action research (Mc Kay, et al, 1998) Strategic actions resolve a problem situation. Organizational change (Lewis, 1994) Highly complex systems can be directed by just a few rules that govern the interactions of their member units. (Wheatley and Kellner-Rogers, 1996) “Clear organization around goals permits maximum autonomy; people are then free to decide how they want to contribute.”</td>
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<td>8. Commitment to the team</td>
<td>The commitment was extraordinary. Everyone was clear about the goal and his or her role. “Everybody was tired, but everybody kept pushing and going on, and that to me was awesome, just to see everybody wanting to see this succeed.” “The most important thing for me was building the team.”</td>
<td>Organization learning, teamwork (Senge, 1998) Being a team player has no meaning until the team plays. “The ‘chemistry’ of any great team is a collective phenomena.” Organization Theory (Eby, et al, 1999) Increasing responsibility and skill variety and empowerment may have a positive effect on organizational commitment.</td>
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<td>9. Ownership of the project</td>
<td>Everyone felt like he or she owned the project. “Everyone felt a part of the project. It was so involving. It was great!”</td>
<td>See Organizational Theory, Eby, et al, above. (Labarre, 1995) Managers often discount the importance of the emotional and personal dimensions of transformation.</td>
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<td>10. Pride in goal attainment</td>
<td>Y2K consisted of a number of subtasks that were completed in the course of the project. Learning had to take place before they could complete some tasks. This seemed to heighten satisfaction when the task was complete. Then, “the day itself, the pride we all shared. Not “I”...“WE” accomplished something as a team. WE really pulled this off.”</td>
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<td><strong>11. Absence of competition</strong></td>
<td>One member comments, “At one of the first meetings, there were so many in the room, we didn’t all have chairs. I thought, what are all of these people going to be doing with us? The core team was so large I thought we were going to experience a lot of conflict because of different personalities, but it was amazing how that core team stuck together throughout to the end, even through our sorrows and losses. That core team reached out and pulled in others, and worked and worked.” “I didn’t see any, ‘my division is more important or know more than your division.’”</td>
<td><strong>Organizational Change</strong> (Wheatley and Kellner-Rogers, 1996A) “Identity is the sense-making capacity of any organization.” We ask how the purpose of our work relates to our personal sense of purpose and then to that of the larger system. (Wheatley and Kellner-Rogers, 1996a) “People and organizations are...meaning seeking.”</td>
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<td><strong>12. Importance of the task transformed the identity of the individual</strong></td>
<td>Identity expanded with the importance of the task and the magnitude of the effort. “When you become a part of the bigger whole, the importance you place on things becomes greater.” “Being a part of the team that was so great in magnitude gave you importance within that team.”</td>
<td><strong>Organizational Change</strong> (Wheatley and Kellner-Rogers, 1996A) “Identity is the sense-making capacity of any organization.” We ask how the purpose of our work relates to our personal sense of purpose and then to that of the larger system. (Wheatley and Kellner-Rogers, 1996a) “People and organizations are...meaning seeking.”</td>
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<td><strong>13. Y2K was a challenge with a number of unknowns</strong></td>
<td>Almost no participants mentioned any fear of dire consequences as a motivation for participation. All mentioned the tremendous challenge of taking on such a large task with so much that was unknown, to identify suspect systems and meet tight deadlines.</td>
<td><strong>Organizational change</strong> (Lewis, 1994) The potential for growth is its greatest in the complexity that exists between stability and chaos.</td>
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<td><strong>14. New learning required to achieve the task</strong></td>
<td>Because of the uniqueness of Y2K, the team lacked an established body of knowledge. Managing the project required teams to learn tasks outside their usual job functions. For example, the systems analyst studied Access so that he could refine the structure of the data base. The electrical engineer opened text books to learn how to perform a lifecycle cost to evaluate purchasing emergency generators. Generators were not cost effective for emergencies alone, so the team studied peak shaving to maximize cost benefit. Since “experts” were not available, the team learned new roles and acquired the expertise necessary to perform required tasks.</td>
<td><strong>Knowledge creating</strong> (Senge, 1998) Knowledge is defined as ‘capacity for effective action... most capacities for action that are important to a company are collective.’ <strong>Knowledge management</strong> (Carayannis, 1999) The Systematic, explicit, deliberate building, renewal, an application of knowledge to maximize an enterprise’s knowledge-related effectiveness...” (Wiig, 1993, in Carayannis, 1999) <strong>Learning organization</strong> (Carayannis, 1999) Knowledge creation can be seen as “information theoretic” and “metacognitive.” Organizations depend on “multi-layered technological learning and unlearning.” (also, Dogson, 1991,1993)</td>
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<td><strong>15. Time spent time in planning</strong></td>
<td>There was much initial planning . “Take time to plan. Build the team.” “People don’t like it when you go fast and don’t take time to build the team.”</td>
<td><strong>Learning Organization</strong> (Senge, 1998)</td>
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<td>16. Awareness of the steps needed to create the result</td>
<td>Meta-learning took place within the project. The Project Manager used the project to further teach PM skills of scheduling, risk, quality etc. Sub-tasks were handled as sub-projects, and sub team managers learned PM skills.</td>
<td>Action research (Stewart, 1998) Knowledge management (Carayannis, 1998) Knowledge management through organizational networks requires both knowledge and meta-knowledge.</td>
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<td>17. Interaction with management at the task level</td>
<td>One member commented, “management rolled up their sleeves and worked along with us. It was great! We didn’t have to go up to their ivory tower.” Y2K was a great leveler. “Management was part of the team.”</td>
<td>Organizational change. Internal enterprise replaces hierarchical structures. (Halal, 1999) (Marquardt and Kearsley, 1999) Layers of management are unnecessary when employees have access to information electronically. Competitive organizations have flatter, more flexible structures. Learning organizations (Marquardt and Kearsley, 1999) “Learning skills will be more important than data.”</td>
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<td>18. Support and commitment of higher management</td>
<td>There were several levels of accountability: first, to the city Y2K team, consisting of project sponsors across the city, next, to department administration, and then to division administration. Project leaders had full authority to command needed resources, human or material. Higher administration supported this commitment.</td>
<td>Learning organizations (Barker and Camarata, 1998) Trust, commitment and perceived organizational support are needed for developing learning organizations. Employees need the opportunities to learn from successful and unsuccessful experiences. Trust and commitment grow in an environment where employees and managers are supportive.</td>
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<td>19. Belief that nothing would happen</td>
<td>Several team members originally believed that Y2K was a non-event, and that all the effort toward compliance was unnecessary. Still, most of those got caught up in the task and performed with equal commitment.</td>
<td>This could imply dissonance.</td>
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Generally, the responses to preliminary interviews can be assigned to one of 5 categories:
1. those dealing with cross-functionality and interdependence, (1-6)
2. those that were related to the goal and commitment to achieving the goal (7-11)
3. those that were descriptive of the work (12-13)
4. those that related to new learning and specific learning that took place during the project. (14-16)
5. those that addressed a new or closer relationship with management during the project. (17-18)
6. not rated (19)

Participants commented on feelings of enhanced identity, camaraderie, responsibility, accomplishment and achievement.

**Conclusion**

“Much like an individual, to create new knowledge means quite literally to recreate the company and everyone in it in non-stop process of personal and organizational self-renewal.” (Nonaka, 1991)

Of the 19 themes identified from the interviews, 6, or about one-third, involved mentions of interdependence and cross-functionality. The next most frequent mention was of goal achievement. It appears from participant response that cross-functional teams existed in service to goal achievement. Participants articulated the value of learning from and with others. They acknowledged interdependencies and their value in sharing for learning as well as goal attainment. It was clear from observing the many meetings and workshops held during the course of the project that participants from of various groups throughout the organization valued the opportunity to come together and share knowledge. These forums created venues for completing Nonaka’s cycles of knowledge creation. (Nonaka, 1991). Further, there is evidence that the Y2K experience allowed the organization to experience complexity, through interdependencies and uncertainty, poised between stability and chaos, where there is the maximum potential for growth. (Lewis, 1994) The project exemplified active learning and active research.

Based on the preliminary results of this study, the authors are suggesting that the learning organization,
knowledge creating, and action research/learning models are appropriate for understanding the impact of Y2K remediation projects. Consideration of the relevance of complexity theory will be reserved for future research. The most prevalent themes in participant interviews were appreciation for working in cross-functional teams and recognition and utilization of their interdependencies for goal attainment and learning.

All models considered involve learning behaviors and imply change. Further study is necessary to suggest the nature of the change. There is some evidence that change has begun to occur with the application of cross-functional teams and project management approaches to other tasks. In future research, the number of interviews will be expanded and objective measures of change studied. This research also has potential implications for organizational change and innovation models.

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