A Study of Knowledge Benefits Gained From Projects: The Electric Utility Industry Y2K Project Experience

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ABSTRACT

Projects can cause organizations to perform in new ways resulting in the generation of knowledge. It is postulated that organizational learning occurs when new knowledge is captured and disseminated to the organization. It is expected that knowledge management facilitates organizational learning. Members of utility Y2K projects were surveyed with respect to knowledge benefits gained from their projects. Strong agreement for the existence of knowledge benefits was found and a listing of benefits generated. However, there was much less agreement on how to capture the benefits with many organizations taking little, if any, action. The conclusion is that while organizations recognize knowledge benefits, many do not have the tools or processes in place to take advantage of them.

INTRODUCTION

Organizational activities such as projects can result in knowledge generation. Organizational learning occurs from the acquisition, distribution, and interpretation of this knowledge by the organization. It was propositioned that organizations would use knowledge management to facilitate organizational learning by providing methods/tools for capturing and disseminating the generated knowledge. To test this proposition, members of utility Y2K projects were surveyed on knowledge generation, perceived knowledge benefits, and methods used to capture knowledge benefits. Utility Y2K projects were selected due to their large scope, high cost, high risk, and high stress suggesting that if any project would result in knowledge generation, then these would be it. However, the results of the survey were mixed. While project personnel were strong in their belief that there were knowledge benefits and could identify several, they were much less positive in their identification of methods for capturing knowledge benefits. This lends doubt as to the amount of organizational learning that actually occurred.

BACKGROUND

Organizational Learning

Organizational Learning has been defined as a quantifiable improvement in activities, increased available knowledge for decision making, or sustainable competitive advantage (Easterby-Smith, 1997; Miller, 1996; Cavaleri, 1994; Dodgson, 1993). Malhotra (1996) defines organizational learning as the process of "detection and correction of errors." In this view organizations learn through individuals acting as agents with individual learning activities facilitated or inhibited by an ecological system of factors that may be called an organizational learning system. Huber (1991) considers four constructs as integrally linked to organizational learning: knowledge acquisition, information distribution, information interpretation, and organizational memory.

Y2K Knowledge Benefits

The result of utility Y2K projects was a quiet rollover into 2000. What began as a high pressure, high visibility project ended suddenly and quietly. The aftermath saw many experts and critics questioning the validity and resources spent on Y2K. Several organizations published responses to these questions. All agreed that Y2K was a real issue and cited knowledge generated from the projects as one of the major gains from Y2K expenditures. Findings from these reports include:

· Success for those who did not spend heavily on Y2K was a result of knowledge sharing by those companies who took the lead in resolving Y2K issues, Cauley and Roth
· The cost of contingency planning is worth it if organizations take the knowledge gained from Y2K and roll it into improved business continuity planning, Gartner Group
· The benefits of Y2K need to be made permanent by changing government practices, Modernising Government in Action: Realising the Benefits of Y2K
· Many benefits were gained from Y2K. These include contingency planning, risk assessment, understanding of systems, and IT management, The Many Silver Linings of the Year 2000 Challenges
· The global Y2K experience created a unique opportunity to learn about how the world works and how international cooperation could be improved, Y2K: Starting the Century Right, Report of the International Y2K Cooperation Center

METHODOLOGY

A survey was prepared to determine the extent of knowledge benefits gained from Y2K and the strategies used to capture them. The subject audience was selected using email lists of utility Y2K project personnel from the Nuclear Energy Institute (NEI) and the Electric Power Research Institute (EPRI) Y2K projects. To ensure similar projects were surveyed the list was edited to lead project personnel from Y2K member utilities in the United States and Canada. The revised list contained three types of individuals: those from corporate wide projects, those from technical site

projects (generation or transmission and distribution), and those from IT projects.

The survey was generated from discussions with lead project personnel from utilities and EPRI and consisted of yes/no survey items that asked respondents to mark all the benefits and strategies that applied to them. Each item also allowed respondents to add benefits and/or strategies not listed. Items were also generated for:

· Establishing grouping by type of projects they supported.

· Determining how wide spread the search for secondary benefits was.

· Determining how strongly respondents agreed that there were knowledge benefits.

The survey was distributed at the end of January, 2000, via email with responses collected, also via email, by February 15, 2000. To encourage openness and improve response rate, anonymity was promised to all respondents. A total of 88 responses were received:

· 7 from IT projects
· 18 from Nuclear projects
· 30 from Non-Nuclear Generation/T&D projects
· 33 from Company wide projects

The 7 IT responses were received from 4 of the 98 companies (4.1%) surveyed and are not considered significant enough to be representative of the industry. This low response was expected as the EPRI and NEI programs targeted embedded systems which are normally designed and maintained by engineering departments so the survey distribution lists included few IT personnel. Results from the IT responses are presented for information. The 18 nuclear responses were received from 16 of the 47 companies (34%) operating nuclear plants and represented 34 of the 103 plants (33%). The 30 non-nuclear generation/T&D responses were received from 24 of the 98 companies (24.5%) surveyed. The 33 corporate wide responses were received from 28 of the 98 companies (28.6%) surveyed. Overall, 53 of the 98 companies (54.1%) provided at least one response. These are considered acceptable for analysis and representative of the industry since the aggregate representation of companies surveyed is over 50% and over 20% for each project.

FINDINGS

Requests to Find Benefits

This item was a yes/no response to: "I/we have been asked to identify ancillary benefits resulting from our Y2K project." 38 of 88 respondents were asked to justify cost and/or identify benefits. However, for corporate wide projects 19 of 33 had been asked to identify benefits. The implication is that corporations are asking about benefits but this request is not getting to the non-corporate projects. These smaller "line" organizations may not have a history of being asked to look for benefits or justify cost and do not feel it is necessary. This is likely a reflection on the regulated aspect of utilities as historically these organizations have had a monopolistic business. This implies utilities may not be used to learning from their projects but that their parent corporate organizations do learn and seek to find as many benefits as possible. Table 1 summarizes these responses.

Table 1 Response Summary to the Request to Find Benefits

GROUP	NUMBER ASKED TO FIND BENEFITS	NUMBER NOT ASKED
Overall	38	50
Corporate Wide	19	14
IS	4	3
Nuclear	5	13
Non-Nuclear Generation/T&D	10	20

Are There Knowledge Benefits

This item used a 5-point Likert scale item where 5 was strongly agree and 1 strongly disagree. 34 of 88 responses strongly agreed there were knowledge benefits, 42 agreed, 8 neither agreed or disagreed, 3 disagreed, and 1 strongly disagreed. This is very strong support in favor of there being knowledge benefits. Table 2 summarizes the responses. An overall score is provided for each group and for the survey as a whole. Also, two scores are provided; the first score is the average score for only agreed/strongly agreed responses. The second score is the average score of all respondents in the group. This was done to evaluate how strongly those who believed there were knowledge benefits supported that belief. The table shows that corporate wide respondents significantly agreed stronger than the other groups. The non-nuclear generation/T&D respondents agreed least strongly. Corporate wide respondents were privy to benefits and knowledge from all groups and succeeded with their projects by brokering this knowledge to all their groups. This group was the most likely to see knowledge benefits and their score supports that assumption.

Table 2 Response Scores from Are There Knowledge Benefits

GROUP	STRONGLY AGREE/ AGREE	ALL RESPONSES
Overall	4.45	4.20
Corporate Wide	4.68	4.58
IS	4.57	4.57
Nuclear	4.33	4.18
Non-Nuclear Generation/T&D	4.18	3.70

Knowledge Benefits

This item asked for observed knowledge benefits. Table 3 summarizes the responses by indicating the percentage of respondents who indicated the item as a knowledge benefit. Table 4 lists additional knowledge benefits and the group that added it.

Contingency Planning/Business Recovery is indicated as the overall top knowledge benefit. This is not unexpected as 1999 was spent by most of the respondent generating contingency plans. Prior to Y2K contingency planning and business recovery were not routinely performed. As a result, organizations learned a great deal about the dependencies within their processes and organizations and how to work around postulated failures in these processes. Two unexpected findings were the strong showing of Public Relations, 51% overall but 62% corporate wide and 56% nuclear; and the relatively weak showing of Software Management, 33% overall and a low of 27% from non-nuclear generation/T&D. Public Relations were highly rated because Y2K was a media event. NEI and EPRI emphasized this. The intense press for the two years prior to the rollover forced companies to learn how to respond and work with the media with respect to tough issues. Software Management doing so poorly is harder to understand. Throughout the Y2K project utilities reported software problems such as version control, lack of configuration management, poor documentation, and lack of expertise on how the software worked. It must be assumed that the respondents felt they knew how to manage software and so did not learn anything from Y2K, they just did not practice it.

The most commonly added knowledge benefits were resource management across functional areas/organizations and added awareness of cyber security.

Table 3 Percentage Indicating Items as Knowledge Benefits

Knowledge Benefit	% Respondents Indicating Item as a Benefit				
	All	Corporate	Nuclear	Non-Nuclear	IS
Contingency/Business Recovery Planning	86	88	75	91	86
Equipment/software inventories/databases	80	84	76	65	100
Collaborative Problem Solving	72	72	63	74	86
Relationship Management	68	69	56	68	100
Test Processes	68	59	69	74	86
Risk Identification/Management	58	63	44	48	86
System Interfaces	55	59	56	41	86
Configuration Management	55	52	56	55	86
Project Management	55	55	63	52	57
Data/Information Management	54	42	94	39	71
Public Relations	51	62	56	41	43
Software Management	33	39	31	27	43

Table 4 Added Knowledge Benefits

Knowledge Benefit	Group Adding Benefit
Improvements in broad based resource management and leveraging	IS, Nuclear, Non-Nuclear Generation/T&D, Corporate Wide
Cyber security visibility	Non-Nuclear Generation/T&D, Corporate Wide
Record retention plans for project information	Nuclear
Creation of corporate wide automated problem reporting systems	Nuclear
Learning to work with contractors and suppliers more cost effectively	Nuclear
Increased level of knowledge for systems and interfaces	Nuclear
Heightened awareness of Software Quality and tracking processes	Nuclear
Overall upgrades of systems to current versions or new systems	Non-Nuclear Generation/T&D

Actions Taken to Capture Knowledge Benefits

This item identified actions organizations were taking to capture knowledge benefits and make them permanent. Table 5 summarizes the responses and provides several surprises. The most surprising is the weakness of responses. All but one of the knowledge benefits had 50% or more agreement. For actions, only two had 50% or more agreement. The highest agreement was only 58%. Table 6 lists respondent added actions taken but only adds four actions. This indicates a consensus that there are knowledge benefits but little consensus as to what actions should be taken to capture and make these benefits permanent.

A somewhat surprising finding is that corporate respondents had the least consensus as to what actions to take with no action exceeding 50%. What makes this surprising is that corporate respondents had the strongest agreement to there being knowledge benefits. It implies that while corporate respondents could more easily see knowledge benefits, they were less able to implement actions to capture them, particularly if the action was in a functional area not "owned" by corporate respondents. It is anticipated that this is caused by these organizations not having well integrated processes making implementing corporate wide actions to capture knowledge benefits difficult.

A final surprising finding is that although several of the identified knowledge benefits included people skills such as cooperative problem solving and relationship management only about 1 in 3 respondents indicate that these Y2K personnel are being further utilized in important projects or positions. Comments made on the responses included:

·   "I am the last surviving project member"
·   "Management couldn't wait to disband the team"
·   "We released people as soon as possible to cut costs"

Two causes are postulated. The first is that many of these projects used personnel from non-IT organizations while the project itself was an IT organization responsibility. Therefore, even though project personnel developed useful people skills, the IT organization did not feel they had the IT skills necessary for the IT organization. The second cause is that Y2K projects tended to use a large number of contract personnel including retirees and these personnel were simply not needed following completion of the project.

Table 5 Percentage Indicating The Action As Being Taken

Knowledge Capture Action	%Respondents Using Knowledge Capture Action				
	All	Corporate	Nuclear	Non-Nuclear	IS
Modifying processes/procedures	58	48	50	61	86
Creating/Modifying support tools	51	42	50	52	86
Creating new processes or procedures	42	35	25	43	100
Re-assign Y2K personnel to more responsible assignments	38	35	38	30	71
Increasing use of Intranets/Bulletin Boards	31	19	38	26	71
Creating/Modifying training	27	26	25	26	43
Post Y2K Lessons Learned Report	27	32	25	22	29
Encouraging Industry Participation	16	13	25	13	29
Leveraging Y2K Success	16	19	6	13	29
Changing Company Goals/Initiatives	12	6	19	13	29
Still Deciding how to make permanent	32	39	19	39	

Table 6 Added Actions

Other Knowledge Actions Taken	Group Taking the Action
Incorporating Y2K analyses into system files or documentation/ Building a Body of Knowledge	Nuclear, Non-Nuclear Generation/T&D
Change corporate culture to be more knowledge and team oriented	Non-Nuclear Generation/T&D
Change perception of Y2K to something that we learned from	Nuclear
Implementing more integrated systems such as SAP	IS

LIMITATIONS ON RESEARCH

The main limitation is from the use of a selected target audience. The audience was selected because they had participated in a knowledge sharing project and were expected to be aware of knowledge benefits. However, this audience is not necessarily reflective of the entire electric utility industry. There are several hundred electric utilities in the United State and only 98 were members of EPRI. These 98 utilities represent the bulk of electrical generation and transmission in the United States. The majority of the companies that did not participate with EPRI were distribution companies or rural electric associations. These companies were considered to have the least risk from Y2K. Additionally, the response rate of around 30% for each group allows that there were sufficient subjects who may have considered the knowledge benefits from Y2K to be too trivial to respond to the survey. This is not considered to be the case. Both authors discussed Y2K knowledge benefits in great detail with participants of the EPRI and NEI efforts and are confident the findings are reflective of electric utility Y2K knowledge benefits.

CONCLUSIONS

There are knowledge benefits from Y2K projects. The strongest agreement with this came from the Corporate, IS, and, Nuclear projects. However, utilities are having trouble capturing these benefits. It is concluded that while many organizations talk of capturing and using knowledge, putting that into practice is difficult and not well understood by the electric utility industry. This does not support the original proposition that organizations would use knowledge management techniques/tools to capture and disseminate knowledge benefits from projects.

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Available upon request

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