Cloud computing: items professional firms consider in selecting data storage firms

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ABSTRACT

This paper reports the results of a portion of an ongoing effort to study professional accounting firms in the U. S. All public accounting firms have certain legal and ethical obligations to protect their clients' interests and records (including electronic ones). However, they are also faced with the impact of changing technology. The research reported in this study describes the experiences of a CPA firm as it attempts to migrate from a traditional networked environment to a cloud computing environment which will also permit it to concurrently achieve success in meeting other firm goals including the CPA firm's continued viability and growth.

Keywords: cloud computing, data storage, IT security, web-enabled, CPA firm

INTRODUCTION

One professional firm, identified in this research only as the CPA Firm, [CPAF] has undertaken strategic planning efforts including that for migrating to cloud computing to address issues of network server costs, file sharing through physical locations, reduction of traditional paper-based record management systems, and disaster recovery. The firm believes the migration will result in reduced operating costs, increased operating flexibility, a move toward a virtual office environment and allow for a quicker recovery from any disaster including disasters as experienced with Hurricane Katrina.

REVIEW OF LITERATURE

Introduced in the 1990s by IBM was the concept of e-business whereby the features of the Internet and the needs of business were linked together to meet the developing needs to replace existing business data exchange systems such as electronic-data-interchange or EDI. Whether known as web-enabled technology, web enabled application, on-Demand computing, web services or utility computing, Cloud Computing has advanced in sophistication and usage (O'Sullivan, 2009). In 2008 Kennedy provided an excellent summary of cloud computing:

> "The term cloud is used because in this system, which includes things like virtual servers, it actually becomes a little difficult to point to exactly where all your data is being stored or managed. It's definitely not in your firm's server room. You also do not install the software you use on your own computer. It's accessible on a website through your browser (Kennedy, 2009)."

A review of the literature related to cloud computing provides the benchmarking needed by professional firms, whether public accounting, legal, or medical firms, to evaluate cloud computing and its business benefits to the practice. In 2009 Murphy and Samir described the impact that decline in core revenues generated by network service providers could be offset partially by migrating to web-enabled services (Murphy, 2009). In 2009 Ho reported the results of an IDC survey of the Asian Pacific region companies in which 11% report cloud computing is currently being used and another 41% were using the results of such applications and/or evaluating its use. The study results indicate that cloud computing services will grow to $42 billion by 2012 (Ho, 2009). Thus, one is able to surmise that the trend is from traditional network services to web-enabled services as demand, business and personal, changes the nature of services.

O'Sullivan described the benefits to businesses that mirror the decline by the network service providers as four critical business considerations: obtaining needed services at a lower cost, minimize or avoid capital expenditures, avoid disruptions of critical business activities, and reduce or avoid significant consulting and implementation fees (O'Sullivan, 2009). The dependence of individuals on technology with a merging of social and business uses into a common technology style was described by Orange in her study of a potential emerging trend of mining the data found in "data clouds" that are rapidly becoming commonplace for social and business activities (Orange, 2009).

In 2009 Cohen provided a descriptive structure for cloud computing options available to businesses: a) The Public Cloud or Internet that is an open, publicly accessible environment and external to the business and where computing resources, services, and applications are available from third-party service providers typically through a subscription and/or use-on-demand basis or charge with a firewall feature provided by the service provider. b) The Private Cloud or a proprietary developed (customized) restricted access environment with a firewall feature provided and maintained by the business. c) The Hybrid Cloud or a combination of the Public Cloud and Private Cloud options with integrates infrastructure features to maximize the access, security, and minimize resource costs (Cohen, 2009). In 2008 Enterprise Innovation described the trend toward cloud computing at its website as a return to a centralized computing model with simpler management, faster services and lower costs whereby businesses are able to procure technology, hardware and software, via the Internet from a pool either provided by a single service provider or multiple-providers (Chan, 2008).

The foundation of cloud computing is found in the use of interactive, collaborative, easy-to-use web tools commonly known as Web 2.0 applications. As Cunningham and Wilkins state Web 2.0 applications have the potential to eliminate or at least significantly reduce the importance of traditional record management for business users (Cunningham, 2009). One key driver of the migration to cloud computing appears to be based upon economics in the form of cost consideration as documented in the network upgrade project at Cardinal Capital in which it determined that aging network servers could be upgraded for a cost of $320,000 or the company could migrate to cloud computing at a cost of $40,200 for over 95 percent of the server architecture (Thomas, 2009). The pros and cons of cloud computing have been discussed by Chan as an effective tool in leveling the playing field between large and small companies and thus effectively remove technology costs as a factor in competition as well as merging social usage with business usage (Chan, 2009).

The negative considerations of cloud computing appear to be centered around security over data and maintaining the integrity of corporate data. In a survey of cloud computing issues Hammond provides two views of these concerns: a) where's the data stored? b) users must migrate their applications and data to third parties' platform and in essence lose control over their applications (Hammond, 2008). Dzubeck further defines the negative considerations by expanding Hammond's views into five areas of concerns: a) Security, b) Performance, c) Management, d) Governance and Regulatory Compliance, and e) Financial (Dzubeck, 2008). In 2009 Robertson described the risks related to cloud computing as: a) Testing the risk of the provider, b) Establishing a level of control over your data locations, c) Reach an agreement about data extraction and code copy-options to insure you can get your data back out. d) Understand the provider's backup/restore capability and make sure you have a plan for change when there is a vendor failure as well as a separate backup of company data, e) Security from external parties that ensure the level of security over company data that you expect from in-house services (Robertson, 2009). The standardization of security over cloud computing platforms should meet the challenges of a) Web application security and intrusion prevention, b) Anti-malware and messaging security screening procedures, and c) UTM (Unified Threat Management) security considerations (Schwartz, 2008).

The CPA firm [CPAF] used as the basis for this case study is considered a full-service public accounting firm. The CPAF has a five -year strategic plan of being fully operational as a regional firm with offices located the small- and mid-size cities targeting businesses and not-for-profit organizations. The workload of the office is measured in terms of billable hours; rather than attempting to measured the firm in terms of the number of clients. Three clients serviced by the firm illustrate the complexity of coordinating the activities within the CPAF. One client is an independent oil and gas entrepreneur that operates over an expanded region which may involve operations in multi-states when exploration is active. A second client is a construction company that has crews operating in four states on a weekly basis. A final illustration is a client who is considering a relocation of his business and personal residence to Canada.

There is an exponential change in the data requirements, storage and retrieval for accounting and tax services with the addition or deletion of new clients to the existing client list. A concurrent change is that of administering a database to permit the firm to manage the required coordination between separate accountants working independently but for the same client. The firm’s workforce is made up of partners, non-partner professionals (accounting seniors and juniors) and various other hourly personnel. The firm currently operates offices in locations within multiple states.

In a recent partner retreat six issues were identified as priority items to achieve the goals of the five-year strategic plan which must be addressed within the next two years if the firm wants to have success in its five-year plan, listed in Table 1 (Appendix). The CPAF partners agreed that a migration to cloud computing will result in reduced operating costs, increased operating flexibility, a move toward a virtual office environment connected "in the clouds" that will permit greater flexibility for all personnel in the firm as well as providing for a quicker recovery from any disaster including the one experienced with Hurricane Katrina as they move toward implementation of their five-year strategic plan.

The CPA Firm (CPAF) partners recognized within the past several years that a paper intensive environment had resulted in a firm-wide system that was in danger of collapse and that there existed a need to reexamine the parameters of the firm's organizational structure as needs of individuals, partners, professional staff members, and non-professional staff have evolved in a technology-changed world. Change was necessary to react to internal factors of the CPAF - the number of employees that use multiple technologies is 100%, a majority of the partners and professional staff have a desire to be employed with a flexible work schedule that permits them to address the needs of aging parents and other family members now residing in an increasingly dispersed geographical area, the increase in clients that are migrating to other locations due to the economic changes occurring within the nation. Thus, the partners decided to address these issues within the context of how does a firm continue to retain professional and non-professional employees as well as partner retention while individuals make decisions related to their own family situation. There have been some limited discussions concerning the costs of personnel leaving the CPAF to move to other geographic areas of the nation resulting in the loss of experienced professionals. One strategic concern for the CPAF is how to operate efficiently while retaining as many key employees as possible with the least cost to the firm. The firm will need to decide how many of the departing employees should be replaced, and if replaced, replaced by a person of what level of experience; can key employees be retained through the use of technology?

During the partners retreat a senior partner was assigned the specific task of developing implementation actions for each of the six strategic issues identified by the partners and the related technology mix that would address meet the needs of the firm. This charge is viewed by the partners as one that must be successful in a two year period for the firm to be successful in meeting the strategic goals to (1) to improve the management of the CPAF processes and work (data) flow within the firm’s system and (2) to undertake implementation actions insure the firm's continued growth and success by improving cost efficiencies through better usage of technology described in its five-year strategic plan.

The research group (authors of the study) used the results of an interview of the senior partner of the CPAF as the basis to the planning and implementation project for a typical CPAF firm as it addresses issues by considering a migration to cloud computing.

STRATEGIC MIGRATION TO THE CLOUDS

The CPAF originally had self-contained computer-based information system housed internally in each of the physical locations of the firm. As growth of the CPAF occurred the firm added a part-time, consulting-in-nature IT support that continues today. Initially under the guidance of the IT consultant the firm's data was backed up on a periodic basis at each location and consistent with the partnership agreement clause governing the level of practice independence between partners. However, no uniform, comprehensive firm backup procedure existed that provided the integrated backup and file sharing-exchange that was effective as new physical locations were added. Rather the IT consultant simply implemented common sense and applied what experience had shown was the minimum service the firm needed. In short, simple use of backup tapes and disks as determined informally by the IT consultant as his time permitted and as decided by the managing partners at the different locations.

However, as the CPAF continued to grow the individual office partners-in-charge began to discuss a uniform, comprehensive plan for file sharing, exchange, and backup; however, the plan remained localized where the services were primarily provided to specific clients. In short, each location was viewed as being basically an independent operation with data (record) management housed locally, an easy plan to manage the merger of practices and addition of professional and non-professional staff. Some efforts were made to store duplicate copies of computerized files in offsite locations separate from where the where the master copies were located.

Experience proved to be a lesson learned. The offices of the firm are located in an area of the U. S. that is prone to hurricanes. While the offices are not located on the coast hurricane hardware and file loses has occurred within the firm and the partners learned from experience what they had been told by the IT consultant that offsite storage was the best course of action when considering disruptions and damage from natural and technology-based disasters. Thus a backup of computerized records with offsite storage became the plan for several years but with no collective decision by all partners due to cost considerations.

There has been also some, even though limited, discussion of personnel leaving to move to other geographic areas of the nation resulting in the loss of experienced professionals. These experiences formed the core of the discussions during the partners' retreat - how to operate with efficiency while addressing the retention issue of key employees with the least cost to the firm.

The senior partner, upon being charged with the responsibility to develop and implement actions for each of the six strategic issues identified by the partners and the related technology mix that would address meet the goals of the firm, met to discuss these actions with members of the research group and separately the IT consultant. The senior partner provided material for the group's use in exchange for input and advice from the research group on his fact-gathering efforts to determine the specific tasks, costs, and benefits to the CPAF in order to address and reach its strategic goals. Additionally, the individual partners and senior professional staff during the CPAF effort were included in the discussion about alternatives and the impact on specific job requirements. The resulting plan was drafted and currently is in circulation to partners and key professional and non-professional staff members, see Table 2 (Appendix).

Address issues of increasing network server costs

The IT consultant provided an estimated cost range, excluding ongoing administration and upgrading, of between $35,000 and $50,000 to install, configure and deploy a network environment which would address the immediate needs related to migrating from the current independent location networks to a single network for multiple locations. An additional annual estimate of $40,000 to $60,000 for ongoing administration, performance monitoring and tuning work would also be required. The senior partner did some review of a study completed by the Crimson Consulting Group in 2005 and believes the estimated costs are likely lower than what actual costs will be once CPAF growth is added to the network needs (Tkach, 2005). His concern about this being the action for the firm to undertake was that the firm would be establishing a network environment that could prove costly to the partners and require a full time in-house IT staff. An option that the partners have expressed concerns about since their experience with clients is that an in-house IT area becomes a cost center rather than a profit center and outsourcing remains a less expensive option.

File sharing and exchanges between physical locations

The partners recognized that the firm had shifted to increasingly having both professional and non-professional staff work at multiple locations within a metro area and thus had unconsciously begun to migrate from a brick-and-mortar view of the firm. Further, the partners recognized that the sharing and availability of client and firm files had become a problem that simple storage devices such as memory sticks, portable hard drives, etc. worked reasonably well but perhaps a firm-wide network was necessary. However, as the partners discussed the alternative solutions they raised the question, "why can we not store the data files somewhere on the Internet where everyone have access to them when needed and not pay for an expensive network upgrade that will be obsolete in a couple of years?" The senior partner estimated that such an expansion by the CPAF into additional states and perhaps countries the cost to establish networked new physical offices would likely add an additional annual $10,000 for each new location in terms of networking costs, a cost that is not desired by the partners.

Eliminating the restrictions inherent in a structure

One partner works around her family which includes a spouse on active duty and two young children. Her work is completed on time; however, often work is done at midnight and sent to others via email. To expect her to be at work when her spouse is overseas and her children need her at home after school is an unreasonable expectation, one that the other partners agree should not be made. An approach that allows the partner to maximize her schedule while contributing to the firm should be encouraged. A non-professional that has been a long-time, valued employee of the firm is experiencing the time constraints related to an elderly parent with chronic health issues. The partners agree that some approach is needed to keep this employee fully employed and retained by the firm. In both examples provided by the senior partner in discussion with the research group he emphasized that the partners were unanimous that the timely completion of work is the priority and not the time period in which the work is performed or even where it is performed.

Reduction of traditional paper-based record management systems

"Going green" is a good goal and meets the personal goals of the partners in the firm. As the senior partner stated to the research group "going green makes sense as a business decision. Any effort that reduces the increasing stacks of paper that we are being buried under in this firm is good. I am not going to tell you how much our annual costs are but it is amazing how much we spend on paper, printer toner, etc. I could go on a month's vacation overseas just on the cost of paper alone."

Recognizing changes in the nature of the workplace

"If our firm can eliminate the requirements that everyone show up at 8 a.m. each day and leave around 5 p.m. we can have a very happy workforce. I'm old school and believe in being here at 7 a.m. ready to work, but as I get older I do like to leave early. But we have several young employees that can't seem to get moving until mid-morning but have no problem staying until late night to get their work completed. Flex-time, variable work schedules - whatever is needed to get the work done. Heck, I even like coming in at 7 a.m. knowing staff work is on my computer ready for me. So if they worked until 9 p.m. I don't really care if what I need is there for me. We need actual billable time and time worked, but when and how it is done, well that's changing in today's world. Hate to say it, but it is changing."

Security

The senior partner stressed that security, controlled access to all client and firm files and documents, protection of client information, identity theft, disaster recovery, and compliance with all professional and regulatory requirements were critical to the CPAF's success. He shared the evaluation criteria he located doing a search of the Internet that he would use from the website "Top Ten Review" which included criteria that are important to the firm:

- Security - multi-level and device specific
- Storage space/price
- Ability to expand storage space or have unlimited capacity
- Users ease of use
- Help/support - technical, telephone, email, online chat, tutorials, user manual (guide), user forums, FAQ
- User able to view specifications
- User able to view screenshots
- User features
- User remote and mobile access
- Private file sharing
- Public file sharing
- Scheduled backup
- File search ability

- Drag and drop features
- Accounts (folders) and sub-accounts (folders)
- SSL encryption
- Password protected (Online Storage Services Review, 2010)

The CPAF senior partner's initial estimate is that the firm initially can migrate to cloud computing for less than $5,000 in annual fees and charges, much less than the estimated costs for upgrades to the existing networked environment at the individual locations. When asked the senior partner declined to name the vendor selected, saying, "Let's wait until we get this working and then we will walk you through it and give a demonstration." The senior partner has circulated a request to firm partners requesting input on the folder-file-client identification structure since it will need to be uniform in detail for common storage. The initial input from two partners is they have similar yet different folders and a file-naming style. These will have to be made uniform prior to any uploading of firm and client files into the online storage system.

The senior partner has established an implementation plan that encourages each location to begin to upload current files effective January 21, 2010. The firm has been working on the plan to identify procedures to transfer stored files in a manner that will denote the latest draft or updated file but yet retain the prior copy for two update cycles. As the senior partner described it, "I learned in college forty years ago that we have backups to our backups and to use the grandfather-father-son concept. In my office we have done that since I have been partner; however, some of the younger ones don't think it is important. They will have to adapt whether they like it or not." The migration toward a more virtual office environment connected "in the clouds" permitting greater flexibility for all personnel in the firm as well as providing for a quicker recovery from any disaster has begun for the CPAF.

The IT consultant has been handed the task to facilitate the training of the non-professional staff first since they will be critical when the professionals ask for assistance. A series of demonstrations of the features of the cloud computing system have been scheduled for the various locations in early January 2010. Members of the research group have been invited to attend. The conversion of daily backup, of all databases and other files at remote sites to the online storage system, are to be handled by the IT consultant and through the 2010 tax season the existing backup at the local sites will continue. The senior partner indicated that his experience related to system conversions with clients that parallel processing until everyone is the best and the firm cannot run a risk during tax season of tax being lost. While this occurs it is estimated that additional IT billings and overtime for non-professional staff will be incurred but are unavoidable costs.

The IT consultant recommended plans for the CPAF which addressed scheduling and needed plans to continue to migrate to online storage all records (files) that are not currently in electronic format and the effort that will be needed within the clerical staff to scan archived paper-based files based upon priorities established by the in-charge partner at each physical location. The IT consultant is to monitor the storage capacity of the online storage system and inform the senior partner when additional storage capacity needs to be arranged.

The CPAF contacted vendors that provided three basic software features for the firm: 1) general ledger system, 2) tax system, and 3) website hosting. From each vendor the firm obtained costs, capacity, maintenance, backup, security, and storage information. The CPAF declined to provide the details of those proposals.

The partners selected the alternative offered by the website hosting company to add cloud computing to its website hosting service which will allow it to address the basic issues raised in their deliberations of how to reduce traditional paper workflows, adjust to the changing nature of the workplace, maintain security over confidential client and firm data, and manage cost. The website host company had recently begun to offer cloud computing data storage capacity to its service options. The vendors for general ledger systems and tax services have begun to plan to provide such features but were not ready to do such when the partners wanted to finalize a decision.

Implementation became a four step plan of action to be completed by the CPAF. First, a change in the contract with the webhost vendor to add the cloud computing capability while having the anticipated increase in storage, usage and transmission capacity. Second, have the IT consultant and senior partner establish designed (assigned) controlled (encrypted security) data storage locations for all individual clients and firm data that must be available for staff and partners; and upload the data to the proper location. Third, train staff on usage, security control changes, and documentation requirements. Fourth, train clients on usage and address questions raised by them on security related to privacy and confidentiality concerns. Implementation results are:

- Contractual change – contract change and effective within one month.
- Designed data storage structure - senior partner and consultant met and created the security and documentation structure to be used. Effective the week after the webhost contract changes were implemented.
- Staff training – partners met with staff and went through the changes and the data storage structure. One day was devoted to staff training. Implemented effective immediately. Staff currently using cloud computing features and migrating client files to the cloud computing storage location.
- Client training – will be done on a client-by-client basis each time firm staff interacts with a client.

CONCLUSIONS

An unanticipated opportunity to arose study a CPA firm's strategic planning to migrate to an online storage and retrieval system and collect data about the successes (and failures) when the firm completed planning activities, decision making, and began implementation. The changes occurring in data storage and cloud computing are rapidly being considered by CPA firms. The firm used in the research study was able to easily migrate to cloud computing with coordinated efforts by a vendor company to meet its strategic goals. This case study allowed researchers to understand the decision making efforts within a professional firm about its strategic goals related to technology usage to address issues related to traditional paper-based activities, a changing workforce environment, and continue a level of data security that is a must for the firm.

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APPENDIX

Table 1: Priority Items Identified

a) Address issues of increasing network server costs.
b) File sharing and exchanges between physical locations - as the client base expands into additional states and countries it becomes cost-prohibitive to establish new physical offices when existing personnel can provide services using technology.
c) Eliminating the restrictions inherent in a structure that expects staff to be at given physical location on a daily basis - the timely completion of work is the priority and not the time period in which the work is performed or even where it is performed.
d) Reduction of traditional paper-based record management systems - "going green" is a good goal.
e) Recognizing changes in the nature of the workplace where personnel will (and should) place high priority on family and other aspects of their lives is important for firm.
f) Security over (including but not limited to) access by only those authorized to access the client and firm data, insuring that all issues related to privacy, confidentiality, regulatory requirements, disaster recovery, and backup are critical to the firm's success.

Table 2: Anticipated Implementation Plan 2009 – 2013 Actions and Milestones*

- Address issues of increasing network server costs
    a. Start - November, 2009
    b. Report to Partners - January, 2010.
- File sharing and exchanges
    a. Start - January, 2010
    b. Report to Partners - September, 2010.
- Reducing dependence on physical offices
    a. Start - August, 2010
    b. Implement procedures in all physical locations and adjust work descriptions, employment and evaluative materials - January, 2011.
    c. Report to Partners - November, 2010 (annual partners' retreat).
- Eliminating the restrictions
    a. Start - August, 2010
    b. Implement procedures to document, verify, and validate the work completion expectation and reconcile with the payroll system.
    c. Report to Partners - November, 2010 (annual partners' retreat).
- Reduction of traditional paper-based record management systems
    a. Start - January, 2010
    b. Develop cost analysis of traditional system
    c. Develop cost of online system
    d. Develop variance analysis

  e. Report to Partners - June, 2011 (summer partners' retreat)

- Recognizing changes in the nature of the workplace
  a. Start January, 2010
  b. Engage services of recognized human resource - employment practices consultant to develop and implement an evaluation protocol for the monitoring of the firm's success in meeting this goal.
  c. Interim report to partners - November partners' retreats (2010 - 2012).
  d. Final report to partners - November, 2013 (annual partners' retreat)
- Security (privacy, confidentiality, regulatory requirements, and disaster recovery)
  a. Start January, 2010
  b. Engage services of IT consultant to work with internal staff to develop and implement an evaluation protocol for the monitoring of the firm's success in meeting this goal.
  c. Interim report to partners - November partners' retreats (2010 - 2012).
  d. Final report to partners - November, 2013 (annual partners' retreat)

*Actions and milestones will be re-evaluated during each annual partner's retreat and the plan updated.