

CONTINUOUS AUDITING: THE USA EXPERIENCE AND CONSIDERATIONS FOR ITS IMPLEMENTATION IN BRAZIL

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ABSTRACT

Continuous Auditing, broadly defined as the transformation of internal and external auditing through the application of modern information technology, is being increasingly adopted by firms throughout the world. Organizations ranging from Siemens, HCA, the Royal Canadian Mounted Police, BIPOP Bank and the Internal Revenue Service are developing tools and practices that will bring assurance closer to the transaction and reduce through automation, the cost of auditing. A June 2006 PricewaterhouseCoopers survey finds that 50% of U.S. companies now use continuous auditing techniques and 31% percent of the rest have already made plans to follow suit. In this article we introduce the concepts of CA to a Brazilian audience and discuss its further application there.

Keywords: Continuous Auditing, CA, Auditing, Implementation, Brazil

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Introduction

The acceleration of information flows and the availability of online real-time enterprise systems had prompted the accounting profession to reconsider what an audit means and how it is carried out. It is now widely believed that the traditional annual audit where the auditor issues ex-post opinions is a relic of a pre-digital age. The shortcomings in the financial reporting and auditing system exposed by such scandals as Enron and Parmalat have both illustrated the importance to a well functioning economy of effective auditing, and exacerbated concerns that the way in which auditing is carried out has to be brought up to date to match the complexity of today's technology enabled global companies.

As a consequence, firms around the world are moving to providing at least some forms of assurance closer to the event in a way that, significantly, has become routine in the financial sector. When banks, traders and credit card issuers face transaction flows running into the billions of dollars on a daily basis, the cost of delay in providing assurance becomes intolerable. That same logic is now transitioning to the non-financial sector as advances in technology reduces the cost of continuous assurance, while the demands of 24/7/365 processes—not to mention, stricter regulation—necessitate tighter controls. As Elliot (1997 p. 64) states: *“On-line reporting based on databases updated in real time will be less wedded to current protocols for periodicity, creating a parallel evolution toward continuous auditing. Continuous auditing may lead to continuous reporting that supplements and eventually replaces the annual audit report. To audit effectively in these environments, auditors will use electronic sensors, software agents and computerized audit programming models.”*

Continuous assurance (CA) is technology-enabled auditing which produces audit results simultaneously with, or a short period of time after, the occurrence of relevant events¹. In comparison with the traditional financial statements audit, CA aims to be more timely, comprehensive, accurate and less costly.

CA is an outcome of a fundamental transformation in business operations and control. Thus, the digitization of the firm through the widespread use of ERP systems, bar coding, radio ID (RFID) chips and automated transaction recording makes it cheaper and easier to gather data at an unprecedented level of detail and with very little time lag from the transaction. In particular, the unique and unprecedented characteristic of such ERP's as SAP™ is that they seamlessly integrates and automates business processes to achieve real time information flows. Since CA is progressively being built upon the firm's underlying ERP system, CA inherits these characteristics. However, CA only achieves its full power, when it takes full advantage of this ability to automate business processes and integrate information flows to develop new real-time analytic procedures far more sophisticated and all-encompassing than anything in use currently.

CA is now beginning to transition from the future of auditing to the practice of auditing. Firms around the world are starting to implement systems that have recognizably CA in their characteristics. A June 2006 PricewaterhouseCoopers survey finds that 50% of U.S. companies now use continuous auditing techniques and 31%

¹ Extracted from the CICA/AICPA Research Study on Continuous Auditing, 1999.

percent of the rest have already made plans to follow suit.² Given the technological basis of CA, perhaps the best metric of the mainstreaming of continuous auditing is the 76,000 hits that the term generates on Google.³ Official centers for CA exist in both the United States and the European Union, with practitioners and vendors (such as SAP, ACL, Caseware and Approva) now outnumbering academic researchers as attendees at the bi-annual global CA conference. Those practitioners include representatives of the major audit firms all of whom have ongoing CA initiatives.

Clearly CA is much more than a technological tool, or even a simple evolution in auditing methodology. CA has the potential to fundamentally change not just the way in which auditing is carried out, but its role in the operation of the firm and the relationship of the auditor with the firm. Such a change will necessitate equally fundamental changes in the regulatory and legal environment within which auditing is undertaken. In the remainder of this paper we first discuss the development of CA and emerging literature in the subject. We conclude with an examination of the state of CA in Brazil.

Development of CA

Vasarhelyi and Halper (1991) first proposed taking advantage of online technology and modern networking to bring auditing closer to the operational process. This paper was not a conceptual piece, but a report on an actual implementation of a monitoring and control process used on billing data at AT&T. Despite this working example of CA, it took until 1999 before the accounting profession, in the form of joint committee of the AICPA and the CICA, took up the issue of CA, describing it in the following way:

“A continuous audit is a methodology that enables independent auditors to provide written assurance on a subject matter, for which an entity’s management is responsible, using a series of auditors’ reports issued virtually simultaneously with, or a short period of time after, the occurrence of events underlying the subject matter.” (CICA/AICPA Research Study on Continuous Auditing, 1999).

The definition of continuous auditing in the CICA Research Report is appropriate for an assurance engagement in which the auditor provides a report for third party users. Continuous assurance consists of any of the methods used by auditors to perform auditing on a more continuous basis and does not require that a report on the results of the audit be prepared. Alternatively, continuous assurance may be defined *as a process that continually tests transactions and controls based upon criteria prescribed by the auditor and identifies anomalies (exceptions) for the auditor to perform additional procedures.* This definition recognizes that while continuous monitoring is viewed as a management function, auditors may likewise perform a continuous monitoring function of the internal control environment (i.e., have a process in place to continually test management’s monitoring processes of internal controls).

Brown et al (2006) reviewed the continuous auditing literature and found a dynamic literature with over sixty papers discussing a wide range of topics and

² CFO.com, June 26, 2006

³ As at 9/13/2006

approaches, which can be classified into six major categories: 1) demand factors, 2) theory and guidance, 3) enabling technologies, 4) applications, 5) cost benefit factors, and 6) case studies.

The issues discussed relative to demand factors included: the increasing complexity and data-intensiveness of the business environment, the existence of more electronic transactions (EDI etc), the ever increasing usage of outsourcing, value chain integration, web based reporting and the users desire reliable information to be disclosed more frequently, more timely and in more detail, XBRL based reporting, and the fact that Sarbanes-Oxley (section #409) prescribes a progressive movement towards “real time reporting.”

As impediments, Brown et al drew attention to the discussion of independence issues (Alles et al 2002) such as who will pay for the large start up costs and who owns work product. Furthermore, the same article suggests considering the difficulties that stagnant legislation and the negative entropy of socio-economic systems poses in slowing the adoption of CA. Under theory and guidance, Brown et al cited articles describing the concepts, proposing a framework and research agenda, providing substantial implementation guidance, discussing implementation challenges, etc.

Vasarhelyi et al [2004] discuss the enabling technologies including statistical methodologies such as belief functions, neural networks as well as technologies from the computer sciences such as database expert systems, intelligent agent and especially technologies for tagging data to facilitate transmission and comparison, most notably XBRL and XBRL-GL. In the applications domain, case studies now exist of CA implementation, such as the pilot implementation of the monitoring and control layers for continuous monitoring of business process controls [Alles et al 2006], the formerly mentioned Continuous Process Auditing System (CPAS) developed at AT&T Bell Laboratories [Vasarhelyi and Halper, 1991], the FRAANK – Financial Reporting and Auditing Agent with Net Knowledge agent for finding text on EDGAR filings [Kogan et al 200xxx], and advanced analytics at HCA [Alles et al 2006b].

There is also an emerging literature of product descriptions in the application domain such as AuSoftware (that checks controls and audit issues at the most distributed levels in very large enterprises, tracks the effects of consolidation and reconciliations on data anomalies), SQL Remote Guard (continuous monitoring and auditing of remote database access activity), and Audit Command Language (ACL) (used for file interrogation, which enables direct access to computerized client data).

The final category of cost benefit issues deals with possible paths along which continuous assurance will evolve, long run operating cost of running database audit, benefits of timely discovery of errors, omissions, and defalcations, cost-effectiveness of automated, software-driven audit procedures, discussion of economic feasibility of continuous audit, an experimental market and laboratory experiment for Continuous Online Audit (COA), and nine benefits of continuous business assurance analytics. We then turn to the drivers of CA, the various flavors in which CA arises and the impact of regulation in the United States—especially the Sarbanes-Oxley Act of 2002—in driving demand for CA.

Drivers of CA

The essence of continuous auditing is that it decreases the latency between management operations and the provision of assurance. In the past managers had access to data that was far more detailed and obviously timelier than the auditor, who came into the picture only at the year's end. But the technology that underlies CA, especially ERP systems, allows auditors to see the same data as managers and at the same time—or even earlier, given their expertise in process monitoring. This has profound implications for whether auditing is seen as a device for ex-post verification or as a means of real-time monitoring. What is clear is that CA will lead to auditors having access to streams of data that they never could obtain cost-effectively before and audit methodologies will have to adapt to this explosion in the magnitude, level of disaggregated detail and timeliness of data.

CA extends the analytical methods of traditional auditing by examining continuous flows of data, with models of system behavior used to establish expectations for data content. Monitoring the content of a firm's data flow focuses on examining both exceptional transactions and exceptional outcomes of expected transactions. CA software will continuously monitor company transactions, comparing their generic characteristics to observed/expected benchmarks, thus identifying anomalous situations. When significant discrepancies occur, alarms are triggered and are routed to the appropriate stakeholders. An example of innovative banking regulation using CA is the provision of real-time audit facilities by the Italian bank, BIPOP to the Italian Central Bank.

While the “electronization” of business processes (Vasarhelyi and Greenstein, 2003) has been actively pursued for several decades, and the implementation of modern ERP systems for over a decade, auditing has been slow to adapt to these environmental changes. First, the electronization of business processes was simply ignored with “auditing around the computer”: whatever information was needed was extracted on paper, an approach still in use to a surprising extent. Subsequently, the auditors started utilizing the new information technology with “auditing through the computer”. However, this process at the best automates standard audit processes and procedures, by using computer productivity tools (e.g., MS Office), and computer-assisted audit techniques (CAAT) that are basically data analysis software. This approach is limited because on the one hand, it does not take advantage of the new technological possibility to automate and integrate various audit processes and procedures, and on the other hand, it does not provide sufficient response to the new challenges of auditing a modern digitized corporation.

Consequently, there is a direct analogy between the automation and integration of business processes and the deployment of ERP systems on the one hand, and the automation and integration of audit processes and the deployment of continuous auditing systems on the other hand. The relationship between ERP and CA extends to lessons on their implementation. ERP has been dogged by the cost and complexity of its implementation, which is a reflection of the fact that it is much more than a technology. Integration of information flows can only proceed when the underlying business processes are also automated and integrated and have achieved a consistency in purpose

and operational practices. As Hammer [1990] predicted, the full benefit of technology only comes about when it is used to completely rethink processes, rather than simply being used to automate what was previously done manually. But ERP goes one step further, by forcing businesses to adapt their processes to the needs of the ERP system, rather than following a “clean sheet” approach where business processes are first reengineered and then the enabling technology is obtained. It turned out to be simply too costly to develop fully customized integrated information systems for different firms and so ERP essentially became “one-size fits most”.

Such issues arise with CA systems, both with regard to the need for customization, and more importantly, about how it will force auditors to analyze and reengineer their audit processes. This has profound implications for the way in which auditing is carried out and the scope of the impact that CA will have on audit practice. CA will first be used to reduce the cost of current audit procedures or to assure processes that cannot easily be assured by traditional methods. But the ERP analogy suggests that it will take time before the investment in the implementation of CA will start paying off. However, once CA reaches a critical mass the technology will itself begin to drive audit methodologies, leading to a true reengineering of audit processes. This will have a transformational effect, especially given that much audit practice remains rather idiosyncratic, and has not been subject to formalization and process analysis, let alone reengineering, thus far. The work with Siemens discussed in Alles et al [2006], puts these issues into practice.

The Traditional Audit vs. the Continuous Audit

The distinction between continuous assurance and the concept of continuous auditing and how both differ from the traditional audit has occupied an excessive amount of space in the academic literature, but significantly, not in practice. (Vasarhelyi and Halper, 1991; Vasarhelyi et. al, 1991; Rezaee et al, 2002). Alles et al [2002] define continuous auditing as the application of modern information technologies to the standard audit products, be they the mandated annual audit opinion or internal auditing for control. Continuous auditing is another step in the path of the evolution of the financial audit from manual to systems based methods. The literature on continuous auditing can restrict itself to technical matters, working under the assumptions that the demand for the mandated audit is a given and that the emerging technologies will be adopted because they are cheaper and more effective than current audit methods. By contrast, continuous assurance sees continuous auditing as only a subset of a much wider range of new, non-statutory products and services that will be made possible by these technologies. In particular, an important subset of continuous assurance is what Alles et al [2006] call “Continuous Control Monitoring” which is the application of technology to the continuous control of business processes. This is often driven by management needs, as opposed to the requirements of external auditors, and typically carried out by internal audit that faces no independence issues with the firm. In practice all forms of this emerging technology driven audit model can be subsumed under “CA”, for as the field matures, definitions start to matter less than application and value creation.

The process of audit changes substantially when CA is put in place. Significant upfront planning is required in a CA environment to address both manual and automated controls and the substantive tests necessary to provide assurance to the auditor that amounts are fairly stated on a real-time basis. Rules on exception coping must be created, the fact that the frequency and nature of evidence is changed must be taken into account, as well as the most important change of all, that assurance is demanded and provided on a less periodic schedule.

Control testing and transaction testing become entwined with little distinction. For example, in testing a transaction in a continuous basis, the automated controls surrounding the transaction will be an integral part of the audit procedures. In other words, as each transaction is tested, its automated controls will likewise be tested. The notion of compliance testing and reliance on controls will take different meanings in a continuous audit environment.

With CA procedures being applied to corporate business processes, auditors will rely heavily on exception reporting of audit results. In this environment, alarms will be necessary to alert auditors to rising exceptions during the continuous testing to enable auditors to take timely address. To provide timely evidence both financial and, to a greater extent, non-financial data will be subjected to audit tests. Analytical procedures will not only encompass traditional analytics, but will include a more advance set of analytics incorporating predictive modeling. For instance, key Performance Indicators (KPIs) on operations will become part of auditors' analytical toolkit.

The Impact of US Regulation on CA

The confidence crisis created by Enron, WorldCom, and others has turned a spotlight on corporate governance and corporate reporting. Not only is the accuracy of the financial statements questioned, but also concerns have arisen over the privacy and security of information technology systems. In response, the US congress passed the Sarbanes-Oxley Act in 2002 and the SEC has subsequently issued rules and regulations to supplement the Act, which are viewed as necessary reforms to restore the public confidence in a public reporting by corporations in the America.

Section 404 of the Sarbanes-Oxley Act required the SEC to establish rules mandating that annual reports of publicly-held companies should include a statement that: (1) acknowledges management's responsibility for establishing and maintaining an adequate system of internal controls and procedures for financial reporting; and (2) provides an assessment of the effectiveness of internal controls and procedures for financial reporting.

In August 2002, the SEC issued rules to comply with the Sarbanes-Oxley Act. These rules required that the chief executive officer and the chief financial officer sign and include in annual and quarterly SEC filings a certification that these individuals:

- Are responsible for establishing and maintaining the disclosure controls and procedures;
- Have evaluated the effectiveness of such controls and procedures within 90 days of the date of the SEC filing;

- Have disclosed to the Audit Committee all significant internal control design or operation deficiencies that could adversely affect the issuer's ability to record, process, summarize and report financial data;
- Have identified to their external auditors any material weaknesses in internal controls; and
- Have presented their conclusions on the effectiveness of those controls and procedures (SEC 2002).

Section 409 was also included in the August 2002 SEC rules to specify “real-time reporting” as a requirement for the acceleration of periodic Security Exchange Act of 1934 (Exchange Act) filings (e.g., quarterly report Form 10-Q and annual report Form 10-K). Using a phased process, the rules will eventually require public companies to file annual reports within sixty days of their year-end and quarterly reports within thirty-five days of the end of the quarter. Ultimately, a continuous monitoring/auditing process will greatly enhance the company’s ability to comply with these accelerated reporting requirements and the wording of section #409 may be interpreted requiring also closer to real time reporting.

In June 2003, the SEC issued rules for implementing Section 404 of the Act. These rules established the requirements for management’s report on internal control over financial reporting and the certification of disclosures in filings under the Exchange Act. The annual report requires management to state:

- Its responsibility for establishing and maintaining adequate internal controls over the financial reporting process;
- The framework (e.g., COSO) used to evaluate internal control;
- The effectiveness of internal control during the year for which the report is issued;
- The issuance and attestation of the external auditor on management’s assessment.

Chief financial officers and information technology (IT) executives consider Section 404 of the Sarbanes-Oxley Act as the most critical part of the Act. Companies are concerned about whether they have appropriate internal controls and financial processes in place to comply with the Act. Hence they are willing to invest in technology solutions (e.g., business performance management solutions, internal compliance dashboards/portals; enabling workflow; replacing/upgrading finance systems; and consolidating ERP systems) to improve compliance with the Act.

Some have argued that the Act created a greater demand for continuous auditing. They contend that continuous auditing will facilitate the overall evaluation and testing of internal controls over financial reporting and provide the necessary assurance to the key executives for making the Section 404 certification. Anecdotal evidence suggests that because of the Section 404 certification requirements, the benefits of continuous auditing will greatly exceed its costs. Since compliance with section 404 has initially been interpreted as the requirement of well documenting internal controls, firms have engaged largely manual efforts either by their staffs or by contracted third parties to perform these duties. Once this task was completed they came to the realization that

some form of an integrated view of the control environment was necessary, which led to the evolution of many software tools and methodologies. Vendors such as Approva and Virsa emerged as leading suppliers. However, these tools albeit of value, still do not come to fully support assessing and supporting a quantitative evaluation of internal controls. In the future world of auditing, internal controls are to be continuously monitored and the result of this monitoring impounded on an ongoing opinion of the data/processes and organizations being monitored.

The New York Stock Exchange (NYSE) and the National Association of Securities Dealers Automated Quotation (NASDAQ) issued governance requirements for listed companies that were approved by the SEC in November 2003. The Financial Executive Institute (FEI), the American Institute of Certified Public Accountants (AICPA), and the Institute of Internal Auditors (IIA) continue to provide guidance to their memberships on governance, compliance with the statutory requirements of the Act, and fraud detection.

In summary, the Sarbanes-Oxley Act and its supplements together with the exchanges' requirements have created an environment requiring companies to develop and implement processes that provide assurance to the senior management so that the internal control systems over financial disclosures are in compliance with the Act. Given that management have to certify within 90 days of an SEC filing that these control systems are adequate and external auditors will be required to attest annually to management's representation, these processes should be monitored continually to provide that assurance. Auditors will be required to develop audit procedures to test these new management processes. Therefore, this environment should create more demand to move to a CA environment.

While from published evidence the US seems to have been leading the emergence of CA, the US environment and its regulations also somewhat deterred, or at least deferred its implementation:

- The highly litigious US economic environment makes firms hesitant to engage in voluntary disclosures or to experiment with new reporting and audit models.
- Audit firms do most of their billing by hours worked and have limited motivation to evolve to a less labor intensive more technology intensive audit model. This problem is not confined to the US, though some practitioners claim that they are now more open to different billing models that are more consistent with the high fixed cost/low variable cost characteristics of CA.
- Section # 404 of the Sarbanes Oxley Act has substantially drained the resources of large US corporations and their attention from financial innovation leaving little place for and energy for continuous reporting or auditing. With increasing evidence the workload and cost of 404 decreases substantially after the first year or two, the environment is likely to become more conducive to CA.
- The same litigious environment has limited the disclosure of non-financial data that can substantially enrich the ability of companies to perform analytic monitoring

Despite encouraging signs of greater openness, it is clear that leadership in the implementation of CA can profitably come from places other than the US, from countries where the environment may be more propitious for the evolution of the new business model inherent in continuous auditing. In the next section the environment and prospects for CA in Brazil are discussed.

CA in Brazil

The major source of knowledge and dissemination on the subject has been the University of Sao Paulo, through the **School of Business and Information Technology**. In June of 2006, the school hosted the 11th World Continuous Auditing Conference. **CONTECSI** The seminars and workshops promoted by the school attract large numbers of executives as well as professors from business schools of other parts of the country. Some of these participants have started to use US consultants to study the impact and cost of implementing CA in their companies.

But the reality is that CA is still in its infancy in Brazil, which is partly due to the lack of Portuguese language CA literature. A more fundamental barrier is that in general, Brazil lacks audit and auditors. For example, there is only one independent auditor for every 25,000 people in Brazil, whereas in the Netherlands there are one for every 900, in England one for every 1,300 and in the US, one for every 2,300. In almost every developed country a significant percentage of companies are audited. But in Brazil, only 3,000 out of almost 4.5 million companies are subject to compulsory audits (Marion, 2003).

As a consequence, instances of Continuous Audit are not public in Brazil. Very few executives, even from the major audit firms, know what CA is. The Latin American president of one such firm confused CA with *Global Audit* (Auditoria Integral) – the evaluation of management policies in general management, including finance, marketing, sales, HR, accounting, etc. Less than a dozen corporations are trying to implement CA.

A few reasons may account for this low penetration of CA among Brazilian executives: First, is the perceived cost of implementing CA and the lack of publicly available case studies of successful CA implementations. The second barrier is the lack of consultants capable of helping companies to implement CA. In a survey Tostes (2006) showed that the few external auditors in Brazil who have heard of CA, consider it a helpful instrument for *internal* auditors. In other words, it was not their turf, and hence, they had no particular interest in pushing the concept. And third, the technology is new and has not been widely implemented in the US and Europe, let alone in Latin America.

The government could benefit the most with the new technology, for it still dominates large sectors of the economy, particularly the oil industry through Petrobras and it owns such leading banks as Banco do Brasil and Caixa Economica. It also manages other sectors of the economy involving large bureaucracies, such as the postal service, health service, social security system, the Income Secretary (analogous to the IRS), the armed forces, and an array of other social services directed toward the poor population, which involves millions of payments on a monthly basis.

On the private front the sectors of Banking and Telecommunications are more prepared to use CA. They have the advantage of a well educated staff and ample resources. The banking industry is more advanced in Brazil than most emerging countries. This success was caused by four decades of high inflation (never below 100% a year), during which they paid relative low real interest rates on demand deposits. After the Real Plan, when inflation was brought down to a level below 8% a year, the interest rates continued to be high, in the range of 25%. These factors made the banking sector the most profitable of the Brazilian economy. Some of the banks were unprepared to operate in a lower inflation rate, and in mid nineties the Central Bank closed several. Inflation is now at 4,5% but interest rates paid by the government are in the range of 15% annually.

These banks employ large IT systems and their staff is well prepared to understand and implement new technologies such as CA. A few of these large banks have more than 3,000 branches. Each branch of the bank, no matter how small, is prepared to sell any of the products commercialized by the conglomerate. They count with the support of IT departments that automatically execute the routines of issuing the proper invoices and bookkeeping entries at each specific legal entity. Today there are approximately 70 banks, 10 of which concentrate more than 60% of the financial assets. A typical “bank” is in reality a financial conglomerate involving a dozen separate legal entities, each with a different commercial activity — merchant banking, investment banking, asset management, insurance, pension fund, health plans and so on.

The other Brazilian sector which can take advantage of CA is telecommunications. Until 1996 the industry was centralized in the Telebras System—operated by the federal government vertically integrated and organized in several subsidiaries that provided their services through a net that connected the whole country. The system never worked well, because the state companies became electoral feuds of the respective governors who boosted operating costs by saturating them with excess employees to the detriment of capital investment. CSN, a metallurgic company had 17.000 employees before being privatized; today it produces twice as much with one third of the staff. A single line of a mobile phone could cost US\$3,000 and the price of a fixed line varied between US\$500 to \$2,000. The restructuring of the system began with the privatization of the Telebrás. A small number of factors made this particular process succeed. First, Brazil benefited from learning the experience of other emerging countries that had made similar decisions. Second, the process was made in six stages, including changes in the Constitution, the issuance of new laws contracts for the coming new private companies and a detailed design of a new institutional model. This model included the creation of an independent regulatory agency, ANATEL, monitor and control the new companies. The objective was to build an economic sector with companies sufficiently large to generate plenty of cash and make the necessary investments in every region of the country. (Pires, 2000) When the privatization was completed, each carrier inherited a set of old companies with outdated equipment, excess people, some with rampant frauds, with large tax liabilities, and who did not pay any dividends. Within a short time they needed to increase tariffs and invest large sums of money to solve those problems and avoid the fate of the discredited privatization movement pursued by the opposition party. The new plan was well designed and executed in most sectors of the economy. Telecommunication and Metallurgy are

operating efficiently, are profitable, have plenty of cash and pay taxes on a regular basis. The only exception is the Energy sector.

Even with the increase in supply, telecommunication is the sector which experiences the greatest number of consumer complaints errors in their monthly statements. It indicates a lack of good internal controls and poor quality of software design systems, fields where Continuous Audit could give a positive contribution.

In addition to banking and telecommunications there are other large companies in every economic sector that could benefit from CA technology. Almost every one of these has an SAP system implemented to help manage their operations, which is the essential prerequisite for CA. The lack of auditors and the rapid changes in its business environment could certainly be perceived as barriers to the implementation of CA in Brazil. But just as much, these factors can also be seen as increasing the demand for the automated and more effective assurance that CA promises.

Conclusion

This paper defined continuous audit, discussed its evolution and state-of the art and compared it with the traditional audit. CA is a dramatic change in the conceptualization of audit, and together with other forms of assurance it will provide third party attestation and guidance for monitoring of transactions, processes and controls in the future. US regulation has been both a motivating force and a form of hindrance to the development of CA. These environmental constrains may provide an opportunity to its flourishing in other countries and environments. While CA is still incipient in Brazil, it offers substantial promise for CA.

References and Further Reading

- Alles, M.A., Kogan, A., and Vasarhelyi, M.A. 2002. Feasibility and Economics of Continuous Assurance. *Auditing: A Journal of Practice and Theory*, Vol. 21, No. 1, 125 – 138 (March).
- Alles, M.A., Brennan, G., Kogan, A., and Vasarhelyi, M.A. 2006. Continuous Monitoring of Business Process Controls: A Pilot Implementation of a Continuous Auditing System at Siemens. *International Journal of Accounting Information Systems*, Vol 7. 137-161.
- Alles, M.A., Brennan, G., Kogan, A., Vasarhelyi, M.A. and Wu, J. 2006b. Continuity Equations: Business-Process Based Audit Benchmarks in Continuous Auditing. Working paper, Rutgers Business School.
- Brown, C.E., Wong, J.A. and Baldwin, A. A., 2006. Research Streams in Continuous Audit: A Review and Analysis of the Existing Literature. Working Paper, Oregon State University.
- CICA/AICPA. 1999. Continuous Auditing. Research Report, Toronto, Canada: The Canadian Institute of Chartered Accountants.
- Elliott, R. 1997. Assurance service opportunities: Implications for academia. *Accounting Horizons* 11 (4): 61-74.

- Elliott, R. 2002. 21st Century assurance. *Auditing: A Journal of Practice & Theory*, Spring.
- Hammer, M. 1990. *Reengineering Work: Don't Automate, Obliterate!* Harvard Business Review.
- Marion, José Carlos. 2003. Preparando-se para a profissão do futuro. *Revista Razão Contábil*, Maio.
- Pires, José Claudio Linhares. 2000. Políticas Regulatórias no setor de telecomunicações: A experiência Internacional e o Caso Brasileiro. BNDES
- Rezaee, A., R. Elam, and A. Sharbatoghlie. 2002. *Continuous Auditing: Building Automated Auditing Capability*. *Auditing: A Journal of Practice and Theory*, Spring.
- Tostes, F. 2006. Coluna "Anoto o que há de novo"; *Cadernos de Contabilidade; FAF/UERJ*.
- Vasarhelyi, M.A., Alles, M.A. and Kogan, A. 2004. Principles of Analytic Monitoring for Continuous Assurance. *Journal of Emerging Technologies in Accounting*, Vol. 1, No. 1, 1-21.
- Vasarhelyi, M.A and M.L. Greenstein. 2003. Underlying Principles of the Electronization of Business: A Research Agenda, *International Journal of Accounting Information Systems*, 49 (2003) pp. 1-25.
- Vasarhelyi, M.A. and Halper, F. 1991. The Continuous Audit of Online Systems. *Auditing: A Journal of Practice and Theory*, 10 (1) 110-125.
- Vasarhelyi, M.A., Alles, M.A. and Kogan, A. 2003. Principles of Analytic Monitoring for Continuous Assurance. Forthcoming, *Journal of Emerging Technologies in Accounting*.

