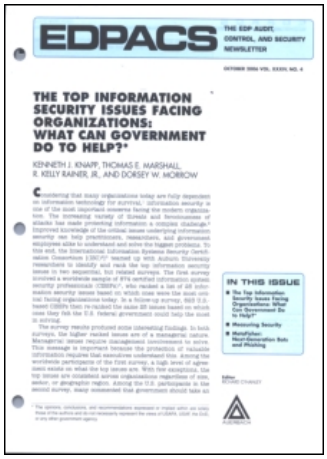

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The Value of Continuous Auditing

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THE VALUE OF CONTINUOUS AUDITING

RONALD M. HOFFER

Is there value in Continuous Auditing? This question can arise whenever the Audit professional seeks to introduce a new auditing technique to their firm. A change such as this will quite likely involve some combination of additional support from the Audit department and executive management, more personnel, disruption to the company's audit plan, or increased cost. Companies do not wish to incur the potential pain in changing a properly functioning process, unless there are clear benefits. This article will not only describe the value derived from Continuous Auditing, but also an implementation approach and the stages for introducing Continuous Auditing.

INTRODUCTION

Continuous Auditing is an auditing technique, rather than a business operations activity, and it includes the frequent auditing of a specific area, function, or set of risks and controls. The risk levels reviewed by auditing can begin to exceed the maximum threshold when the business has changed over time but proper risk management was not conducted and a follow-up audit was not performed within a reasonable time frame. Risk management is performed to understand the risks involved in a given activity, determine the desired levels of risk that are deemed acceptable by the organization, and to ensure the risk levels do not exceed the thresholds established by the firm.

As stated, risk management should be simply another part of the overall operations activity. The Wire Services function established by many banks is an example of an operations activity requiring risk management. The act of wiring funds includes the various processes supporting the request to wire funds from one party to another, through the final act of moving those funds. Wire Services activity presents a large potential, or inherent risk, to the organization. Without the proper controls in place, one could transfer an unlimited amount of money, from an account that does not include the necessary funds, to a location that is considered a prime location for money laundering and terrorist activities. These controls may include checks to confirm that sufficient funds exist in the source account before a wire is performed, checks to ensure money is not wired to a location deemed off-limits by the federal government having jurisdiction over the bank initiating the wire transfer, and numerous checks to confirm the party requesting the wire is authorized to perform that function from the account

IN THIS ISSUE

■ The Value of Continuous Auditing

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that would be the source of funds. All of the checks mentioned are examples of controls instituted by the Wire Services function. The auditing function would not actually manage those checks (controls), but would rather confirm that they are properly functioning. The Wire Services manager would ensure those controls are established and are functioning properly.

The Auditing department has the responsibility to test the key controls established and maintained by the Wire Services

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management. Those tests involve a combination of multiple activities, including interviews of critical Wire Services personnel, reviewing policies and procedures for appropriateness, and performing substantive testing on the data entered and transacted by the Wire Services department. This substantive testing is conducted to confirm the data does not exceed the permitted values, fits within the established Wire Services policies, and does not present excessive risk to the organization. If a key control sets a upper limit to the dollar amount that may be transmitted by the Wire Services department, then the department's database can be reviewed to confirm that no wires were processed in excess of the upper limit, typically written in department policy.

There is considerable documented material on Continuous Auditing techniques, and how they can be used to prevent problems in properly managing risk. Numerous books, magazine articles, Internet reviews, and discussions by industry groups and professional associations such as the Institute of Internal Auditors (The IIA), have recently appeared. A 2006 survey performed by Pricewaterhouse Coopers will be used in the discussion of the usage of Continuous Auditing throughout numerous businesses and types of businesses. The survey will address the level of use, the challenges involved, and the benefits.

Analysis will be performed on information selected from the appropriate publications, along with personal interview/questionnaires, to identify how Continuous Auditing can be integrated into an overall risk management activity, and what pitfalls and/or challenges may arise during the integration. The results of this analysis can be used to improve and streamline the on-going effort to introduce Continuous Auditing to your firm.

WHAT IS CONTINUOUS AUDITING?

Simply put, Continuous Auditing is "a method used to automatically perform control and risk assessments on a more frequent basis. Technology is the key to enabling such an approach" (Coderre, Verver, & Warren Jr., 2005, pp. 1). Risk assessments can be considered a deliverable arising from the continuous audit review discussed earlier, however, they have increasingly been required of the business units, due to the changes in the financial services industry guidelines as enacted by the multiple regulatory agencies in the United States. The technology involved in Continuous Auditing is not just a single piece of software, but entire systems comprised of automated processes and procedures, complex data stores, relationships among the various data entities held within the data stores, specialized analytical tools, and enhanced reporting capabilities. The data stores, specialized analytical tools, and enhanced reporting capabilities utilized by Continuous Auditing are what set it apart from the normal process of auditing, even if that auditing is performed on a recurring basis, such as quarterly.

The automated processes and procedures for monitoring risk are an integral part of Continuous Auditing. These automated routines serve multiple purposes. The first is to initiate the audit review activity and collect the data without requiring the auditor's time. This is essential in order to let the auditor obtain the needed data for more areas than would be reviewed in the traditional cycle audit approach. A second purpose is to provide scalability. As the

firm grows it accumulates more data, which requires more review time by the auditor. Automated processes can handle increased quantities of data without requiring more auditor time. Finally, the audit data can be obtained at quicker intervals than is possible in the cycle audit. Rather than performing the audit once a year, it can be done quarterly and not require any additional time. In short, the automation allows for more audit coverage more often.

The information collected from the automation discussed earlier must be stored in a way that facilitates easy and flexible retrieval for future analysis and reporting. Complex data stores, often in the form of large data warehouses, should be established and maintained in order to support the goals of the Continuous Auditing effort. This data will be needed not only to conduct the review currently in process, but also to provide a historical perspective so often required to be able to identify transaction anomalies and business trends. Fraudulent Accounts Payable transactions, for example, can be identified using Benford's Law, but only when sufficient historical information is available. "Benford's Law provides a data analysis method that can help alert CPAs to possible errors, potential fraud, manipulative biases, costly processing inefficiencies or other irregularities. This rule, established by Frank Benford, states that numbers with low first digits occurred more frequently in the world and calculated the expected frequencies of the digits in tabulated data" (Nigrini, 1999, pp. 1).

As this historical information grows over time, the data warehouse technologies are particularly suited to managing these large quantities of data while maintaining reasonable performance. In other words, a data warehouse is vital when expecting to conduct significant historical analysis within an acceptable time frame. Data Warehouse technology has existed and has been in use for at least a decade, more than enough time to ensure that it is mature and robust, and is supported by multiple vendors. Support by several vendors helps to assure stability, reliability, and maturity through natural marketplace competition.

In addition, data must be connected to related information in order to draw complete conclusions about the enterprise, not just to consider transactions in a specific business unit. Natural relationships exist within a grouping of data, such as the association of a customer number to an order. Similarly, suppliers, invoices, and payments are related using various numbers used to simplify the payment processing activity. These relationships become more complex as the analyst attempts to connect customers, orders, suppliers, invoices, inventories, shipments, and payments together, in order to determine if any fraud exists in the process of ordering parts and equipment, and the payment for those orders. Additionally, the analyst can review the length of time needed for customers to pay their bills, and to what extent the accounts receivable cycle time can be shortened. Shortening that timeframe can result in quicker receipt of monies owed, resulting in a lower needed level of financing, which in turn would decrease interest payments on the debt financing.

These relationships are also important in assessing and reporting on the enterprise-wide risk experienced by an organization, not just the risk experienced by a single area or business unit. Financial institutions, for example, often have different business units established to support the various types of lending. Commercial loans, small business loans, and residential loans may all be

driven by separate and distinct business units. Each of these will maintain their own level of risk, based on the goals established by the heads of the respective business units. For example, each business unit may elect to maintain a moderate level of risk. However, when the risk level of the three areas combined is assessed, a different picture can emerge. Concentration risk (the risk that the majority of a bank's borrowers operate in the same business space) may exceed the overall corporation's threshold when a risk assessment is done across those three. For example, each business unit may perform lending to firms and individuals that operate in different commercial markets and geographic areas. However, when the customers for the three lending areas are aggregated, it might show that all individuals and businesses receiving loans are downstream from a single supplier. If this single supplier's business began collapsing, then all could be affected. This is an example of a concentration risk that may not appear when analyzing just one lending unit.

SPECIALIZED ANALYTICAL TOOLS ARE INTEGRAL TO IMPLEMENTING CONTINUOUS AUDITING.

Specialized analytical tools are integral to implementing Continuous Auditing. Considerable information can be stored in the data warehouse, but without the right tools, this information cannot be properly extracted, linked together and analyzed, allowing complete conclusions to be drawn. These tools can also be bundled under the umbrella term, Data Mining. "Data Mining (DM) is an enabling methodology for Continuous Auditing in the sense that it finds patterns in data sets through statistical analysis and visual displays. Organizations can reap substantial benefits by performing DM" (Abdolmohammadi & Sharbatouglie, 2005, p. 79). One of the challenges to Data Mining comes in its definition. There is no one universal definition for the technology. Some view the technology as simply any type of data extract pulled from a data repository, including data warehouses. A data repository can be something as disorganized as a single file storing order transactions, to organized databases housing all information about customers and their purchases, to highly integrated and organized data warehouses. Others view Data Mining as a defined activity involving artificial intelligence, neural networks/databases, and data warehousing. Further, some insist true Data Mining is not performed unless complex statistical analysis software and techniques are employed as part of the complete package. This author will define Data Mining as the process of (1) a combination of organized data stored in a common area, (2) the data extract capabilities, and (3) the ability to fully analyze the data and report on it using advanced analysis software tools. The easiest way to conceptualize Data Mining is to consider it as a process as mentioned earlier, rather than a product. As a result, the auditor will use Data Mining to deliver a product, such as risk rating.

When an organization formalizes their process and typically names that process, it becomes the company's methodology. One example of a methodology for Data Mining is the CRISP-DM methodology, established by a 1996 consortium of companies including DaimlerChrysler, SPSS, and NCR. CRISP-DM stands for Cross-Industry Standard Process for Data Mining, and is the market-leading approach by 43%, according to a 2004 survey conducted by The IIA. Another example is the SAS Institute's SEMMA model. The SEMMA acronym stands for Select, Explore, Modify, Model, and Assess. Integral to the SEMMA approach is having a thorough understanding of the data and the relationships

existing among the various data groups. SEMMA is a resource-intensive process involving both significant personnel time as well as computer time. As a result, the process should not be utilized for every management query, but rather for the most important requests, such as those supporting a key initiative within the company. Having the correct understanding of the data and its relationships, the auditor can perform the required analysis and reporting. There is the assumption that proper data integrity exists at the start of the Data Mining effort.

Proper data integrity is tantamount to performing effective Data Mining. For the purposes of this discussion, proper data integrity involves all required fields to contain valid values, data values are correctly bounded (for example, a person's gender is coded either male or female), and key fields contain values that can be found in supporting tables. For example, if a customer's order data record contains the customer number, then the Customer table should contain an instance of that customer number so that the Order record and the Customer record can be joined together to obtain all relevant information.

The first step in performing Data Mining, whether one uses the CRISP-DM, SEMMA, other methodology, is to obtain the data. The problem is that not every Data Mining tool includes the extract and analysis capability. Many specialize and focus on the analysis portion. In those instances, an extract tool must be introduced first. Data warehouses are most often implemented using a relational database product, from such vendors as Microsoft, Oracle, or IBM. A standard part of a relational database is the SQL (Structured Query Language) extract, data modification and reporting tool. SQL is an industry-standard language for extracting data using relatively simple commands such that an application programmer may not be needed in order to properly extract the data. SQL commands can either be directly issued to the database by the individual desiring the data, or SQL can be treated as a middleware product that interfaces with more user friendly data request and ad-hoc reporting tools produced by ACL, Business Objects, or Cognos, to name a few companies. Once the desired data is extracted, and of course maintaining the needed relationships, it can be fed to a data analysis tool.

Note that there are data extract tools available for data sources, or even data warehouses, not built using relational database technology. Numerous packages exist to extract data from mainframe application databases. These tools can extract the data from the mainframe and store it on the user PC's hard drive, or on a network drive that the user can easily access. From there, the data analysis tools can be used.

One of the most easily performed analysis techniques is called Data Profiling. It is used to detect patterns in financial data, such as accounts payable records. These patterns include identifying duplicate invoices, checking for round numbers (a fraud detection technique), and a relative size factor. The latter technique is performed by dividing the largest number in the subset of data (such as a set of invoices) by the second largest number for each subset. This can identify any possible errors in the amounts entered.

Several more advanced Data Mining techniques exist for the purpose of conducting the analysis of the data, including cluster analysis, correlation analysis, regression modeling and analysis,

Table 1 *Data Mining Techniques*

Data Mining Technique	Description
Cluster Analysis	This groups closely related records using common values in key data fields. The technique helps identify targeted marketing efforts to specific groups with a certain level of income, for example.
Correlation Analysis	This technique begins by assembling multiple clusters, and then identifies the relationships between groups of records based on shared characteristics. This can help explore the strength of the relationship between various clusters.
Regression Modeling and Analysis	This is used to evaluate the significance of several independent variables on one or more dependent variables. This can be used to predict the validity of a credit card transaction based on time and date of purchase.
Neural Networks	This technique involves artificial intelligence and attempts to mimic the way the human brain processes data. It vastly expands the ability to compare multiple independent variables.
Classification and Regression Trees	This set of techniques tends to function as variations on neural networks, and are used as predictive techniques to define parameters for models in neural nets. A simple example is to establish an IF-THEN rule such as "IF sex=male and income is over $60,000 and credit rating is excellent, THEN send promotional literature" (Abdolmohammadi & Sharbatouglie, 2005, p. 93).

neural networks, and classification and regression trees. Each is briefly defined in Table 1.

These techniques are applied against the extracted data, for the purpose of testing the key controls discussed earlier.

Oftentimes, the required data analysis will involve one or more statistical techniques in addition to or in lieu of one or more Data Mining techniques. These statistical techniques are typically implemented using specialized software packages. Numerous packages exist to support this analysis, including ones from companies such as MiniTab, SPSS, and SAS. Although not designed as a purely statistical package, the ACL tool will function rather well for the average auditor not fully versed in statistical analysis and the operation of the more advanced tools.

A number of different statistical analysis techniques exist; however Table 2 highlights the more common ones, along with an explanation of each technique.

Once the data analysis is conducted, the resulting information must be presented using suitable reporting tools. These tools must have rather advanced reporting capabilities, in order to compute any needed derived fields, filter out unnecessary information, join files to link related data, prepare appropriate headers and footers, and then produce the reports in formats appropriate for management.

Table 2 *Data Analysis Techniques*

Data Analysis Technique	Description
Trend Analysis	This type of analysis technique includes a comparison of current results as compared to at least one prior period, and oftentimes multiple periods.
Mean Dispersion Analysis	This technique assists in determining if an activity is functioning properly, and helps to identify areas of unexpected variation.
Benchmarking Analysis	A comparison is drawn between pre-determined expectations and current results. The pre-determined expectations are often established based on past trends and industry standards.
Ratio Analysis	This uses two or more ratio values to display what changes have occurred over time.
Digital Analysis	Expected digital frequencies are compared against current results to identify deviations. Benford's Law involves these frequency distributions for multiple numbers.
Advanced Digital Analysis	This technique begins with Digital Analysis and advances the technique to conduct fraud investigations in such areas as commodity trading, insurance claims, etc.

The reader should be beginning to wonder which method is the best to use, and what skill level is needed to conduct the analysis and reporting discussed earlier. There is no simple answer; however, it should be clear that this type of analysis requires specialized training and skills, which the average auditor may not possess. Properly performing the analysis requires a complete and targeted skill-set, just as performing the auditor's other job duties requires a complete and targeted auditor skill-set. "Adding these complex tools to an already complex Continuous Auditing activity can result in an environment in need of specialized talent that may require substantial investment" (Abdolmohammadi & Sharbatouglie, 2005, p. 93). In the absence of training, the auditor will use the techniques they are most comfortable with, which would not include these new analytical techniques.

The 2006 Pricewaterhouse Coopers survey of Continuous Auditing usage also presents findings on the training needs. In particular, the survey indicated "Auditors also need to develop and maintain the technical competencies necessary to access, manipulate, and analyze the data contained in disparate information systems" (Anderson & Chambers, 2006, p. 6).

BENEFITS AND LIMITS OF CONTINUOUS AUDITING

General Benefits

Continuous Auditing can provide multiple benefits. The most obvious one is how quickly significant risks and/or control deficiencies can be identified, and reported to management. The cycle audit approach would only identify these risks and control problems when the audit was performed. If an audit was performed every three years, and the last audit was just completed a month ago but new problems surfaced since then, it would be nearly three years until the next audit would occur and the problems would be identified. By then there could be significant weaknesses in the business model, and considerable negative impact to the business. In the event that the recently surfaced problems were financial in nature, the result of the next audit might be that multiple years of earnings reporting would be restated. There have been many instances recently of similar restatements, which in cases resulted in stock price declines. Problems of this magnitude can be quite damaging for years, and could lead to senior officer dismissals.

Data integrity within the firm can be improved through the use of well-placed Continuous Auditing routines. As data errors (or control deficiencies resulting in the processing of erroneous data) are identified using Continuous Auditing, they can be reviewed and corrected in a more timely fashion. Oftentimes the range of values possible for a given data field are controlled by a central reference file. If that reference file is updated to contain values that are outside of company or department policy, the integrity of the data will be compromised. The longer this goes undetected, the more the invalid values become propagated throughout the firm. As these invalid values flow to downstream systems, the effort to correct the problem later on increases exponentially. In the event that there are multiple downstream systems, numerous business units may become negatively impacted, and reliable decision making and financial reporting becomes questionable at best.

Once this propagation occurs, the effort to clean up the bad data is much greater, and requires more time to remediate. Continuous Auditing's ability to quickly identify these variances and control data integrity will be easily seen.

Continuous Auditing can improve the operating efficiency and effectiveness of individual business units. Those areas in charge of managing and clearing suspense accounts, for example, will be notified of accumulating account balances and will know to address this situation more quickly. This rapid response will assist the overall business by having up to the minute financial data, allowing for more accurate and timely decision making.

More accurate data, stronger decision making, and up to the minute financial information can result in several additional benefits. Better control of data and operations may suggest lower financial risk for an organization. As risk levels decrease, a company's stock price can increase. Investors are more likely to invest in well run firms that have solid controls in place and maintain real time views on their operations. Regulators view strong controls and effective operations as indicators of lower risk. Lower risk firms, for those overseen by regulators such as financial and healthcare firms, may receive less regulator oversight. Less oversight is always desirable, and can result in more flexibility for management in their ability to properly run their business operations.

Establishing the Continuous Auditing environment yields a substantial benefit to the Internal Audit organization. The effort to identify key controls in the various business units, and the time spent to make sure the business unit data is completely understood, can result in a better understanding of all aspects of the company's business environment. The auditors' improved understanding will enable them to:

- ☐ Present a more accurate picture of business risk.
- ☐ Conduct more efficient audit reviews in a shorter period of time.
- ☐ Lower the impact of the disruption stemming from auditing a business unit.
- ☐ More effectively and accurately conclude on the operations and risk existing in the unit.

The centralized data warehouse established as a result of the Continuous Auditing effort will prove beneficial to multiple groups. Auditing, by its design, reviews data from numerous business units. This cross-division information repository can be a useful, easily accessible, and integrated information source for reporting of financial results, business trends, areas requiring attention, or background data supporting strategic decision making. The technology employed by the data warehouse will most likely support information access and extraction much quicker and less expensively than the legacy systems used by many firms. These legacy systems oftentimes utilize older technologies that are cumbersome to access and do not include tools for access by the end user. Rather, they quite often require an individual from the Information Technology (I.T.) organization within the firm to produce program code in order to perform the reports and data extracts. The I.T. personnel are often overworked with many system requests already in their work queue, resulting in the requester waiting a significant amount of time until their report or data extract need is fulfilled. In the event that the request did not

result in the required data, much time may be lost in re-requesting the correct information.

Fraud can be detected earlier as a result of implementing Continuous Auditing. As established earlier in this article, Continuous Auditing can assist in obtaining financial information earlier, often in real time. This quicker identification of risk and earlier detection of problems lends itself well to the area of fraud. Fraud often manifests itself in the appearance of seemingly legitimate transactions that appear anomalous when compared against larger populations. The application of Benford's Law, as previously discussed, can help in identifying transactions that may be fraudulent. The failure of key controls designed to prevent or detect fraud can be found through the Continuous Auditing activity, as well as even the changing of key controls in order to bypass the fraud detection built into a company's standard processing, can be detected by this effort.

FRAUD CAN BE DETECTED EARLIER AS A RESULT OF IMPLEMENTING CONTINUOUS AUDITING.

Fraud can also be prevented through the implementation of Continuous Auditing, as the potential fraudster may believe there is a higher likelihood of getting caught, as a result of the quicker identification of fraudulent transactions.

The Pricewaterhouse Coopers survey contained similar findings related to the benefits of Continuous Auditing. Among the findings were a faster and cheaper audit process, increased efficiency and effectiveness, and more frequently updated risk assessments (these can be updated as often as daily, given the daily feedback on the effectiveness of the controls). The greatest benefit reported was the audit group's ability to communicate more effectively with the business units regarding both their understanding of the risks in the business unit's environment as well as the assessments of controls effectiveness. The shorter audit "cycle" times also resulted in more frequent discussions about emerging trends.

A final point should be made relative to the benefits and limitations of Continuous Auditing. Consider that the decision to audit a given area is quite likely based on prior indicators of increased risk in a specific area. There is a higher likelihood that a less than satisfactory audit rating may arise from an audit of that area. If this same approach is taken in order to determine which audits will be performed, then it stands that a large percentage of those audits may result in less than satisfactory ratings. To the uninformed, that could suggest that the control structure for the entire organization may be failing and the overall organization risk is spiraling higher, and out of control. Continuous Auditing should only be initiated after careful communication and training has been done with the company's senior officers and board of directors.

Challenges and Limits of Continuous Auditing

Continuous Auditing cannot be the solution for all audit organizations. This approach clearly requires significant changes to occur in order to substantially support it. It requires quite an investment in new software tools such as extract, analysis and reporting tools, analytical skill-sets through the acquisition of new personnel, and training for existing employees. A large organizational investment must be made in consolidating data into a central data repository. The data consolidation will be considerable, in order to identify,

understand, and extract the required data, prepare it for appropriate linking through established relationships, and streamline the storage to allow for efficient extraction and reporting. This new repository, or data warehouse, must be built with tools and software that will support the ad-hoc analysis and reporting. These tools and software may be new to the organization, which will require an investment in training for support personnel. The shift in auditing techniques needed to conduct Continuous Auditing will present some disruption to the audit area. There will be a required transition timeframe, and the understanding and support of the firm's senior officers, in order to ensure long-term success of the program. In other words, Continuous Auditing may not be appropriate for firms not prepared for the extra costs and time needed to implement it.

Organizational size and ability to support the new technique are not the only limits. The success of the technique itself is limited by the fact that it continually performs the same tests, particularly when the testing is at least partially automated. As new risks emerge, or changes in the business environment occur, the testing may become outdated. Testing may be performed against risks that are no longer applicable, or those that do not represent the highest risks to the audited area in question. It is this concept that requires a periodic risk assessment effort over the entire audit universe, to confirm the audit plan still addresses the required areas.

The Pricewaterhouse Coopers survey identified the principal challenges in implementing Continuous Auditing related to their efforts expended in defining audit activities. Thirty-seven percent responded to this being their number one difficulty. The other problems included deploying technology to support Continuous Auditing (20%), obtaining internal support (18%), determining who should perform the Continuous Auditing (13%), and lastly, the cost involved in implementing Continuous Auditing (12%).

The Audit Director's Roundtable (ADR) group conducted research in 2004 to determine where Continuous Auditing belongs, and where its use would provide limited benefit. The group reviewed the gamut of low to high risk business activities and the extent to which an acceptable return could be realized by the usage of Continuous Auditing in each activity. They concluded several areas would be better suited for Continuous Auditing, and where a "high automation potential" existed. These areas are presented in Table 3.

Similarly, the ADR group identified business areas that did not benefit as much, and had a lower potential for automation and Continuous Auditing. These are presented in Table 4.

Table 3 ***Business Areas Well Suited for Continuous Monitoring***

High Potential, Low Risk	High Potential, High Risk
Cash Disbursements Payroll Processing	Account Reconciliations IT Security
Travel and Entertainment Compliance Procurement	Insider Trading
	Account Management
	Bank Teller Cash Difference Fluctuations

Table 4 ***Business Areas Not-Well Suited for Continuous Monitoring***

Low Potential, Low Risk	Low Potential, High Risk
Corporate Communications	Acquisition Integration
Fixed Asset Spending	Strategic Planning
Waste Management	New System Development

CONTINUOUS AUDITING IS A TECHNIQUE, A COMPLETE METHODOLOGY FOR AN ALTERNATIVE WAY TO CONDUCT AUDITING, AND IS AN IMPLEMENTATION OF MULTIPLE SOFTWARE TOOLS AND FUNCTIONS.

CONTINUOUS AUDITING VERSUS CONTINUOUS MONITORING

Continuous Monitoring Defined

Continuous Monitoring is often confused with Continuous Auditing; however, they are two distinctly different auditing techniques. Continuous Monitoring can be defined as "...an independent mechanism to automatically monitor internal controls effectiveness within key business processes...." (Groman, 2004, p. vii). Note that this definition describes the monitoring of internal controls, rather than testing those controls. Monitoring those controls refers to the continual review of the results (this can be automatic or manual sampling), and then comparing them against pre-established "norms." Significant variances from the "norms" are then noted for potential follow-up in subsequent audits, at the discretion of Audit management. These "norms" are referred to as Key Risk Indicators.

Key Risk Indicators (KRIs) can be viewed as thresholds or measuring points, from which significant variances and/or trends can be observed. They will normally specify an upper or lower endpoint, and results outside of the endpoint are noted in terms of the percent variance. As an example, a key risk indicator might be a budget variance of at least 10% higher than estimates. These KRIs may be specified as an absolute, as in the inability to collect on loans due to the lack of promised collateral. As trending can be an integral part of the monitoring of these KRIs, the results of the monitoring may point to an increasing trend in the number or size of the uncollectible debts, for example.

Although multiple definitions of Continuous Monitoring are offered earlier, many more exist. Suffice it to say that Continuous Monitoring is more of a comparison activity conducted routinely over time, and it involves flagging results that exceed set thresholds.

Continuous Monitoring and Continuous Auditing Compared

Continuous Auditing takes Continuous Monitoring to the next level. The creation of a data warehouse, the implementation of advanced analytical and reporting tools, and the additional training and skills needed to support Continuous Auditing far surpass the Continuous Monitoring techniques and capabilities. Continuous Auditing is a technique, a complete methodology for an alternative way to conduct auditing, and is an implementation of multiple software tools and functions. Continuous Auditing periodically tests

one or more controls, and ultimately facilitates the complete analysis and conclusion of the performance of those controls using advanced tools not included in Continuous Monitoring testing (note here that the testing of these controls is performed during auditing activity, and results in conclusions that appear in formal Audit Department communications). In the event the firm does not have an enterprise-wide data warehouse, the introduction of Continuous Auditing can assist in establishing a data warehouse for the enterprise, and establish relationships among diverse business units, while assisting in improving the overall understanding of the company's data by the numerous business units involved in the data warehouse project.

Not every firm agrees with the aforementioned definition. In fact, many definitions of Continuous Auditing can be found in current literature. A recent publication by the Audit Director's Roundtable indicates "Internal Auditors face conflicting definitions around the terms 'continuous monitoring' and 'continuous auditing'." Discussions were held with several senior audit managers within Union Bank of California's (UBOC) auditing function, including the bank's General Auditor, and responses similar to the ADR's interviewees were received. Each of the managers had a different definition, however, there were concepts common to all interviewed. All agreed that Continuous Auditing involves control testing, and Continuous Monitoring typically did not. Each saw Continuous Auditing as a concept to include multiple aspects of auditing, and many saw the integration of technology as key to enabling Continuous Auditing.

The main difference seen in the UBOC audit managers' answers was in the extent to which Continuous Auditing represented a complete approach. Some indicated that Continuous Auditing is not realized until all monitoring, reviewing, analysis, reporting, and repeated risk assessment is performed. Others felt that the definition of Continuous Auditing was met by performing Continuous Monitoring plus controls testing.

Due to the considerable effort required to establish a fully functional and productive Continuous Auditing environment, Continuous Monitoring may be an excellent first step for some firms. This is particularly true for those organizations not already maintaining and updating an enterprise-wide data warehouse. Because Continuous Monitoring involves less personnel time commitments, software costs, and training expenditures, it may be the ideal stepping stone for companies wishing to improve their auditing effectiveness while at the same time incurring minimal disruption to the auditing activity already in place within the firm.

USAGE THROUGHOUT THE BANKING INDUSTRY

Twelve west coast–based banks were contacted by this author to research their Continuous Auditing usage or implementation plans; seven responses were received. The survey results from the respondents portray an industry in transition. Half of the respondents reported they use Continuous Auditing now; one was using it but stopped due to budget cut backs (one individual was using the approach, but was laid-off). Only one respondent indicated they have used Continuous Auditing more than five years. About half were also using Continuous Monitoring.

Most of the respondents indicated they have a data warehouse that is used by their auditors. Of interest was that one of the respondents indicated they are using Continuous Auditing but do not have a data warehouse. Clearly they do not believe the two are necessarily related, which was discussed earlier in this article. The fact remains that there are multiple definitions of what is meant by Continuous Auditing.

The majority of the respondents use the ACL tool both for data extraction from the data warehouse as well as for analysis and reporting. This is not surprising given the fact that ACL is the second-most used tool used by the auditing profession for data analysis (Abdolmohammadi & Sharbatouglie, 2005, p. 95). Although the tool enjoys broad usage across the industry, it is clear the industry either does not understand the need for more advanced tools or does not have the resources to utilize those tools for enhanced analytics and reporting. One respondent did report using the SAS tool for analysis; however, that bank was the largest by asset size of the respondents. The only other tool used by most of the respondents, for reporting purposes, was the Microsoft Office suite.

The Pricewaterhouse Coopers survey, by comparison, was performed on 444 companies, and 392 responded to the survey for audit-related questions. The survey identified the fact that 81% of the respondents either now use Continuous Auditing or are planning to develop a program in-house. Only 19% indicated they have no plans to use the methodology. This survey also found that the percentage of companies already using Continuous Auditing went up from 35% in 2005 to 50% in 2006. Further, 57% of the respondents indicated they considered a quarterly "cycle" as the optimum frequency for conducting the Continuous Auditing review work. Only 9% indicated they perform daily auditing and data collection.

Both the author's survey, as well as the Pricewaterhouse Coopers survey, reported that at least half of the responding firms indicating Continuous Auditing was already in use, with more using Continuous Monitoring and many having plans to implement Continuous Auditing in the future.

AUTOMATING CONTINUOUS AUDITING

Automating the Continuous Auditing techniques can produce significant benefits, in terms of efficiency of processing, cost reductions, and consistency of the process. Efficiency improvements are seen in the reduction of hours spent by highly trained personnel on routine tasks that can be easily performed by a computer. The computer systems can be programmed and configured to automatically perform periodic extracts of required data from the source systems and automatically load it into the data warehouse. These automated extract routines can be set to execute at pre-determined times, such as the beginning or end of the month, after all month-end processing is performed and after all required reconciliations are accomplished. The data loads into the data warehouse are typically run through a standard data warehousing process called Extract, Transformation, and Load, or ETL. The ETL processes can be automated to make the necessary configurations, relationships, and data massaging without extra

help from personnel, thus freeing up their time for more useful tasks.

Cost reductions are a by-product of the automation effort, as trained analysts and auditors do not need to spend their time pressing buttons on a computer to perform the needed data loading tasks, and the personnel does not need to perform the mundane data manipulation/transformation tasks that can be easily scripted from the company's business rules. The data extraction, data massaging, and data loading effort can be performed seamlessly by computers automatically as expected, and the analysts and auditors can use their vast business knowledge, audit skills, and advanced analytical training to review the data loaded into the data warehouse for the purpose of identifying trends, anomalies, indications of fraud, and control failures.

Another benefit to automating this process is in the consistency of the activity. People are good at conducting analysis and using reasoning abilities that computers do not possess (ignoring the limited "reasoning" abilities that some claim is available through the use of neural network computers). Computers are good at performing the same tasks over and over, and performing it at a set time and date. This consistency in performing the scripted activity provides a level of comfort and reliability that the correct data was extracted when needed, the same date range of data is extracted every month (for example, a full thirty days of data every month), and nothing was omitted from the extract.

The initial establishment of automated routines and calculations does require more up-front investment, in terms of time spent testing to ensure everything is working as expected and the validity of the process can be guaranteed with reasonable certainty. Complete and fully documented test plans and test results can assist in providing the assurance that correct data was extracted, transformed, and properly loaded as expected and no information was omitted or improperly transformed.

The Pricewaterhouse Coopers survey also provided information on the extent of automation used within the Continuous Auditing activity. Approximately 56% of the respondents indicated they conduct a combination of manual and automated routines; however, only 3% say they have completely automated the process. The respondents defined automation as the implementation of purchased software for data extraction and report writing, and the implementation of Enterprise Resource Planning (ERP) systems. ERP systems typically involve an integrated suite of software modules to manage the process of taking customer orders, through order fulfillment and inventory restocking, to final distribution, invoicing, and accepting payments. ERP also includes modules to manage human resource activities, payroll, general ledger, accounts receivables, and accounts payables, among the more popular features of ERP. The survey determined that past efforts by the respondents to automate the Continuous Auditing activity meant the involvement of tools in order to conduct detailed transaction testing only. The other activities related to auditing, including the data storage, analysis, and reporting were performed outside the automated functions.

IMPLEMENTATION

Implementing Continuous Auditing can be onerous, but there is clearly more than one way to accomplish this, ranging the gamut of decreasing cycle time until the next audit, to implementing all aspects of Continuous Auditing, including the automation. Previous sections of this article have discussed a number of different paths taken by various firms, as supported by this author, and the Pricewaterhouse Coopers survey conducted in 2006.

The Audit Director's Roundtable (ADR) group provided additional input on the possible approaches to achieving Continuous Auditing, based on their discussions with numerous financial and non-financial institutions. One of those institutions went a step further by identifying the components needed in order to permit a successful implementation of Continuous Auditing. These components are: (1) reliable systems, (2) highly automated audit procedures, (3) reliable means of obtaining results of audit procedures on a timely basis, (4) high degree of audit proficiency in I.T. [Information Technology] and audited subject matter, (5) timely availability of and control over auditor's reports, and (6) the subject matter has suitable characteristics (Groman, 2004, p. 33).

The ADR group provided more general steps through the usage of continuous control monitoring, or simply continuous monitoring. "With the aid of sophisticated data extraction and analysis tools, Internal Audit can automate the monitoring of controls to identify control breakdowns. The process enables rolling audit planning as Internal Audit can use the results to achieve more frequent and deeper insight in the risk landscape and direct audit resources to the neediest areas. While the true continuous auditing vision requires further technology advances and validation, Internal Audit can begin reaping the benefits now by focusing on continuous control monitoring" (Groman, 2004, p. 12).

The primary approaches for implementing Continuous Auditing, based on this author's summarization of the various steps identified in the research, appear in Table 5.

Table 5 can be considered an implementation guideline, to assist the audit group in pursuing the complete Continuous Auditing capability in steps. The steps in the table assume complete discussion, agreement, and support by the company's board, senior officers,

Table 5 ***Continuous Auditing Implementation Steps***

Approach Category	Description
Cycle an audit more often	This can be considered the first step to implementing Continuous Auditing; however, by itself it is not Continuous Auditing.
Introduce a data warehouse	This is a more realistic first step in the CA implementation, where multiple data sources are consolidated into one repository with complete data relationships.
Introduce an extract/analysis tool	Introducing an extract tool containing at least some analytical abilities will bring the firm closer to full CA, in conjunction with a data warehouse.
Introduce a Data Mining tool	A Data Mining tool, which may or may not contain data extract capabilities, will permit the auditor to conduct advanced analysis on the extracted data, for reporting purposes.
Implement Continuous Monitoring	Continuous Monitoring will introduce more rapid data collection and make the data available for analysis, but falls short of the full analytical capabilities required by CA.
Establish a new methodology	This implements a complete CA approach, plus the extract, storage, analysis, and reporting capabilities.
Establish a new methodology plus automation	This takes the previous category a final step by fully automating the extract and load effort.

the audit committee, the senior audit executive, and regulatory agencies first; however, this is a valid assumption for a financial institution given the close scrutiny of the audit department by the various oversight areas.

A final area for consideration is what group within the firm actually performs the Continuous Auditing and monitoring. Most of the discussions in this article have focused on the Internal Audit group as the primary driver and owner for Continuous Auditing. The ADR group suggested both Internal Audit and business units can and should be involved, and perform the monitoring: "Both Internal Audit and management should accept management's monitoring responsibility to reap mutual benefits" (pp. 63). The point is well taken. Business unit management is responsible for managing the business, including the risk accepted by conducting that business. Internal Audit's job is to independently assess risk, and report to the board and other senior officers as appropriate. Because the business units must manage risk, they cannot wait for Audit's assessment of risk before they begin taking action. They should perform the monitoring themselves before Internal Audit arrives.

CONCLUSIONS

Continuous Auditing is an evolving methodology, despite the fact that it has been eight years since the Institute of Internal Auditors (The IIA) first published discussion papers on the subject. For every book or other publication on Continuous Auditing, there seems to be an equal number of different definitions. At its core, Continuous Auditing is considered a methodology, it tightly integrates the use of technology as an enabler, and it requires a higher level of investment in trained personnel.

Similar to Continuous Monitoring, the Continuous Auditing methodology involves a continuing review of a given business unit area, process, or activity. The methodology assumes the audit function will have a strong understanding of the data processed by the business unit under review, as well as the relationships among the various entities maintaining the data sources. This is a notable distinction for Continuous Auditing, as the traditional audit approach does not necessarily require a solid understanding of business unit and data relationships; individual units could be audited in a vacuum, without consideration of other areas.

Continuous Auditing cannot be effectively and properly performed without the integration of technology. Technology is essential in order to document and maintain unit and data relationships, support the data analysis, uncover anomalies and trends, and point to areas of control weaknesses. Further, technology permits adequate analysis of vast amounts of data without requiring large numbers of personnel. Finally, technology is essential to overcome the limitations experienced by legacy technology solutions implemented years or decades ago, long before current analysis, reporting capabilities, and tools were created.

Advanced analytical training for audit personnel is also a core component for Continuous Auditing. It's not enough to create a central data warehouse, use existing data extraction tools, and issue a directive to the audit team to identify risky areas. Most

auditors do not have the required background to utilize advanced Data Mining tools and conduct complex analyses using statistical models and equations. Substantial training is required in order to ensure the Continuous Audit analysis is performed as needed, and for the auditor to proceed beyond the process of visually "eyeballing" a set of data and attempting to identify variances and results outside of expected thresholds.

Another conclusion relates to the benefits that may be realized by implementing Continuous Auditing. The majority of the papers, books, and other publications used for this article indicate general concurrence that Continuous Auditing will shorten the time needed to identify a weakness, improve the overall understanding of the business unit and their data by the auditors, permit more advanced research and drawn conclusions, and improve risk identification and assessment by the audit function.

The primary question posed in this article can now be answered. That is, "Is there value in Continuous Auditing?" Well, there are clear and multiple benefits to using the methodology, it is backed by one of the auditing industry's chief advocates, The IIA, and is embraced by a large number of firms in various industries throughout the U.S.

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