Fundamentals of continuous auditing and monitoring in enterprise resource planning systems

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Abstract: The new economic realities including the evolving regulatory environment, increased globalization, market pressure to improve operations, and rapidly changing business conditions are pressuring organizations to improve their methods of performing ongoing evaluation of internal controls by both internal audit and management. Objectives of the generally accepted framework for testing and monitoring of internal controls, the COSO Enterprise Risk Management Integrated Framework, encourage audit to approach their activities from a business perspective and require organizations to quickly gain access to valuable information in order to manage risk and improve performance ensuring the effectiveness of internal controls and a proper risk mitigation. The paper presents the basic concepts of continuous auditing and monitoring in enterprise resource planning systems by demonstrating the benefits of such IT investments following a compliance and performance perspective, and explores technology usage in support of continuous auditing and monitoring.

Key-Words: continuous auditing, continuous monitoring, integrated IT solutions, ERP systems, risk management, audit performance

1 Introduction
The new economic realities including the evolving regulatory environment, increased globalization, market pressure to improve operations, and rapidly changing business conditions are pressuring organizations to improve their methods of performing ongoing evaluation of internal controls by both internal audit and management.
Objectives of the generally accepted framework for the testing and monitoring of internal controls, the COSO Enterprise Risk Management Integrated Framework, encourage audit to approach their activities from a business perspective and require organizations to quickly gain access to valuable information in order to manage risk and improve performance ensuring the effectiveness of internal controls and a proper risk mitigation.

According to The Institute of Internal Auditors the concept of continuous auditing (CA) is connected to the one of continuous monitoring (CM).

CA is a method used by auditors to perform audit-related activities on a continuous basis. Activities range from continuous control assessment to continuous risk assessment. Technology plays a key role in making it a viable option through automation.

CM of controls is a process that management puts in place to ensure its policies and procedures are adhered to, and that business processes are operating effectively. CM involves automated continuous testing of all transactions within a given business process area against a suite of control rules.

The expected benefits of a CA/CM software implementation targeting ERP systems mainly consists of increased ability to mitigate business risks, reductions in the cost of assessing internal controls, increased confidence in financial results, improvements to financial operations, reductions in financial errors and potential fraud, increased profitability.

2 Parallels and differences between concepts
Basic features in understanding the concepts of CA and CM, the parallels and the differences between them are presented in Table 1 and Table 2.

<table>
<thead>
<tr>
<th>Continuous auditing</th>
<th>Continuous monitoring</th>
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<tbody>
<tr>
<td>Collection of audit evidence and indicators by an internal auditor on information technology (IT) systems, processes, transactions, and controls.</td>
<td>Feedback mechanism used by management to ensure that controls operate as designed and transactions are processed as prescribed.</td>
</tr>
<tr>
<td>Provides organizations with greater audit coverage (100 % of the population).</td>
<td>Is the responsibility of management and can form an important component of the control structure.</td>
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<th>Continuous auditing</th>
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<tr>
<td>Redesigns the traditional audit approach so it can become repeatable and sustainable.</td>
<td>Changes the traditional approach of management by having the process owners focus on business risk and performance monitoring.</td>
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<tr>
<td>Allows the internal audit team to automatically identify control breakdowns in real time (allowing action to be taken immediately) by keeping track of specific controls, transactions, and business events as they occur.</td>
<td>Gives management the ability to effectively monitor those areas most important to it, using either risk or performance lens.</td>
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<td>Tends to raise the internal audit overall importance within the organization.</td>
<td>Enhances the way internal controls are monitored, thereby improving risk management and business performance.</td>
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Table 1. Parallels and similarities between CA and CM features.

<table>
<thead>
<tr>
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<th>Continuous monitoring</th>
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<tbody>
<tr>
<td>Is directed at providing the internal audit department with better risk and control information.</td>
<td>Is clearly a management monitoring function.</td>
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<tr>
<td>Is focused on key controls providing assurance at the audit objective level.</td>
<td>Allows for a more granular focus across all operational levels</td>
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Table 2. Differences between CA and CM features.

3 Main objectives
The goal of a CA/CM software implementation is an array of automated evaluations performed through the use of automated tools and procedures, some on a real-time basis and others on a defined frequency based on performance cycle and risk, and a point-in-time assessment or an assessment of all controls on a real-time basis. In achieving this goal the organization must integrate the existing ERP system with an enterprise risk management (ERM) program monitoring capabilities from both a CA and CM perspective. The ERM program ensures an efficient and effective control and activity design covering a range of financial, regulatory, fraud, and operational risks. The desired result is to coordinate
the efforts of internal audit with management to avoid duplication of efforts and unproductive usage of resources.

The value of the software solutions, as tools for the CA and CM, is in their ability to translate a business rule to a configurable control and assess transactions’ performance against expected results. When a configurable control or transaction does not conform to a predefined risk-based business rule pattern or trend, an alert as a “red flag” can be automatically generated. A red flag could be an email notification to the business user and a supervisor, or a summary dashboard by control points, process area, and operating unit.

As shown above, the CA and CM solutions goals are bringing greater transparency for continuous assurance and performance and their success is dependent upon the effective use of technology tools. Either internal or external to the ERP platform, CA and CM solutions achieve their goals by 1) monitoring a system’s global configuration settings, access controls, and rules that define the parameters of how an event or transaction can be initiated, processed, and recorded, 2) creating rules and tests run against the actual flow of transactions, identifying exceptions, anomalous patterns and trends, or other outliers that represent risk or are contrary to expected measures of performance such as key performance indicators (KPIs), and 3) providing historical or emerging trends evaluation within risk and performance areas, allowing management to increase business performance.

4 Integrating CA and CM into ERP systems

Enterprise Resource Planning (ERP) integrates internal and external management information, facilitating horizontal and vertical integration of business processes across an organization via a synchronized suite of software applications (Hunton et al 2004). Most ERP systems incorporate industry best practices reflecting the vendor’s interpretation of the most effective way or de-facto standards to perform each business process thus easing compliance with international financial and audit requirements such as IFRS, Sarbanes-Oxley, or Basel II.

The overall success rate of a CA and CM implementation within an ERP system depends on many factors and can be represented by the following function extending the one presented by Gray et al (2010):

$$CA/CM_{sr} = f(IS, IC, IP, RU, ET, RT) \quad (1)$$

where $CA/CM_{sr}$ represents the success rate of a given CA/CM implementation, IS - type of implementation structure, IC – type of implementation connection, IP – type of implementation platform, RU – resource usage, ET – extraction timing, RT – review timing.

Either integrated or distributed, the CA/CM implementation structure closely mimics the structure of the ERP system being audited. If the ERP system has a monolithic structure the CA/CM implementation is usually tightly integrated; if the ERP system consists of multiple loosely coupled applications, multiple CA/CM software agents forming a distributed system are needed to target each ERP application.

There are two types of connections to the underlying ERP data, direct and intermediated. A direct connection means direct access to one of the first two layers (from bottom-up) of an ERP system: application layer or database layer. This connection type is the fastest but comes with the penalty of having to implement the CA/CM solution within the same platform and programming language as the ERP system. In this case the CA/CM implementation can’t be easily ported to other types of ERP systems.

If direct access is not feasible, the CA/CM implementation can use intermediated access. This can be achieved via remote enabled ERP functions capable of being triggered from outside the system or authenticated web services. Remote enabled ERP functions require both the ERP system and the CA/CM implementation be present on the same network, usually behind a firewall. A good example of such functions is SAP BAPIs, Business Application Programming Interface, enabling remote access to SAP defined functions.

When using authenticated web services for intermediated data access, whether or not the ERP system and the CA/CM implementation are present on the same network is irrelevant. Both can always use HTTP GET, HTTP POST and SOAP protocols over an internet connection. A web service describes itself via a Web Services Description Language in XML format. This document contains full information on how to query the web service and what kind of result format to expect. The XBRL global standard for exchanging business information between business systems is a natural choice when feeding ERP data into a CA/CM implementation via web services. Based on the XML format it is the preferred choice of transferring data when using web services while its business oriented xml structure meets the CA/CM data requirements.
The CA/CM implementation can reside on the same platform with the ERP system or on a completely separated one. If the ERP system hosts the CA/CM implementation, the implementation is referred to as an embedded audit module (EAM). If the implementation is hosted on a separate platform, the implementation is referred to as monitoring and control layer (MCL). Being tightly coupled with the ERP systems, EAMs are more vulnerable to manipulation compared to the more isolated MCLs offering better code protection (Alles et al). But they can also monitor the ERP more closely and be triggered by suspicious events compared to the MCLs which can’t query the ERP too often due to system usage constraints and may miss suspicious events (Alles et al). Also, CMLs relies little on the cooperation of the enterprise personnel. Regarding solution vendors, EAMs are usually provided by ERP vendors while CMLs are usually provided by third party vendors and audit firms.

The resource usage factor combines mean and peak memory, disk space and cpu usage requirements. Depending on the current processed CA/CM task - data transfers, single or multiple table lookup, various calculations – the usage requirements can vary significantly. The more robust the CA/CM implementation is, the faster it executes and reacts to suspicious events.

The interval between an event occurrence and its recording by the CA/CM implementation represents the extraction timing factor Gray et al (2010). This can happen in real time, very frequent or periodic with the corresponding continuous auditing and monitoring types.

The interval between the event recording and its review represents the review timing interval factor Gray et al (2010). The sooner the company knows about the event either through its employees or external auditors, the sooner it can react by taking appropriate measures.

5 Conclusion
In light of today’s challenges, the companies must find new ways to respond effectively to the demands of a rapidly changing business environment and an increasingly complex regulatory environment focusing heavily on issues of risk, control and audit. Implementing CA and CM will have a significant impact on how business decisions are made and monitored by reconsidering the timing of reporting processes and changing the type, speed, and visibility of information on risk and performance. A CA and CM software implementation for an ERP system will preserve the completeness, accuracy, consistency, and reliability of data. It can reduce the overall cost of compliance by improving the efficiency of business processes and the audit function. It adds business value by generating better information to facilitate timely business decisions regarding risk and performance. The return on this investment is quickly realized through improvements to an organization’s bottom-line results, based on the timely identification of increased risk, errors, and fraud, and the creation of a stronger internal control environment across the enterprise.

References: