A conceptual model for evaluating systems with continuous assurance services

Rui Pedro Marques\textsuperscript{a,}\textsuperscript{*}, Henrique Santos\textsuperscript{a}, Carlos Santos\textsuperscript{b}

\textsuperscript{a}Algoritmi, Universidade do Minho, Campus de Azurém 4800 Guimarães, Portugal
\textsuperscript{b}Govcopp, Universidade de Aveiro, Campus de Santiago 3810 Aveiro, Portugal

Abstract

Nowadays there is a need for real-time awareness to assure conformity of organizational transactions to increase their reliability and to mitigate organizational risk. In this context, Continuous Assurance has assumed an important role as a management goal and in ensuring improved effectiveness of organizations. Some information systems already support Continuous Assurance services, but disposable data require extra effort to make it useful for management purposes. Hence, this paper presents a model constituted by five dimensions aiming to evaluate an information system with Continuous Assurance services. Moreover, each dimension has some proposed metrics to guide the development of an evaluation tool.

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\textsuperscript{*} Corresponding author. Tel.: + 351 253 510180; fax: + 351 253 510189.
E-mail address: ruimarques@ua.pt
1. Introduction

In the current organizational context in which competition is part of the daily life, there is a constant need for more timely, relevant and reliable information to help the management team with the decision making, achieve the planned objectives and foresee prospects for the future.

In this context, Continuous Assurance has been asserting itself and assuming an increasingly important role within organizations, as a function of management support and to ensure the economic and efficient use of resources and the effectiveness of organizations, areas where the potential impact of new risks, caused by the constant change, fierce competition and widespread access to global information, are more sensed [1].

The audit is defined as a systematic process of objective gathering and evaluation of evidence on organizational data and transactions to verify their compliance with the established standards and criteria. The communication of auditing findings to stakeholders is an assurance service. However, assurance is a much broader concept because it includes all professional services that ensure the quality of the information or its context, for decision makers [2]. The IFAC (International Federation of Accountants) has defined the assurance services as those which allow a practitioner to express a conclusion designed to increase the level of confidence of the intended users other than the responsible party about the result of the evaluation or measurement of a subject matter against a given criteria [3].

Continuous Assurance is defined as the application of emerging information technologies to the standard techniques of auditing, both mandatory periodic auditing and internal auditing. In that view, Continuous Assurance presents itself as a new step in the evolution of transaction auditing from manual techniques to automated methods. The term "continuous" does not mean hard real-time, but in a timely way to be use-effective, considering, respecting and being consistent with the pulse and rhythm of each organizational transaction and process [1].

Continuous Assurance has thrived within organizations as a set of services involved in diagnosing certain situations, including the company's viability, allegations of fraud and illegal acts, assessing the economy, efficiency and effectiveness of organizations [1, 4]. The known cases of fraud at companies like Lehman Brothers, A-Tec, Madoff, Kaupthing Bank, Enron, WorldCom, Parmalat, Tyco, Xerox, among others, led these organizations and their stakeholders to bankruptcy or to very compromising situations. The fraud has caused huge losses to investors in recent years, leading also to the loss of financial credibility and integrity.

Similarly, the independent audit service also seems to have suffered a heavy blow because of these frauds. In this scenario, Continuous Assurance emerges as a set of services which aims to restore the credibility of auditing, allowing at the same time organizations to meet the requirements of regulations [1, 5, 6].

The work presented in this paper is framed in a more comprehensive research project which intends to develop a solution with Continuous Assurance services for the real-time monitoring and auditing of organizational transactions at a very low-level [7]. Thus, this paper presents and promotes a model which allows to evaluate an information system with Continuous Assurance services.

The paper is organized the following way. Section 2 of the paper gives a brief overview about the Continuous Assurance concept, its objectives and components. Section 3 discusses the evaluation model proposed by the authors, and section 4 gives some conclusions and a recommendation for future work.

2. Continuous assurance

Continuous Assurance is an aggregate of objectively provided assurance services, derived from continuous online management information structures, whose objective is to improve the accuracy of corporate information processes [8]. The concept of Continuous Assurance refers to the set of services which, making use of technology, uses the information immediately and produces audit results simultaneously or within a
short period of time after the occurrence of relevant events. Also, Continuous Assurance allows analytical monitoring of business processes. Compared to the traditional auditing process, Continuous Assurance is intended to be timely, more comprehensive, more accurate and more supportive to management [9-12].

Moreover, Continuous Assurance has provided a gradual change in audit practice for the maximum possible degree of automation. Given the emphasis on the transformation of the entire auditing system, the development of Continuous Assurance requires a fundamental reassessment of all aspects of auditing, in particular on how data is made available to the auditor, the checks and tests necessary to carry out, how alerts are managed, what kind of reports are issued, how often and to whom they are sent, and many other factors whose importance will be only noticed after the implementation of Continuous Assurance [1].

The AICPA (American Institute of Certified Public Accountants) defines the assurance services as independent professional services which improve information quality or its context for decision makers. AICPA adds that the assurance services can involve any type of information, financial or not, about discrete phenomena or about the processes or systems (internal control, for example) directly (as information about a product) or indirectly (such as information on some statement about a product), or even internal or external information to the decision maker [13]. Continuous Assurance is a form of auditing by exception, in other words, systems are considered functionally correct until a failure occurs and an alarm is triggered [12].

When Continuous Assurance services are running in real time they give the opportunity to manage processes and transactions simultaneously with its execution or after a particular event. In some cases, they even provide the ability to interfere with the completion of the transaction, correcting it. In addition, organizational processes and transactions have their own life cycles. They can be online or with frequency of hours, days, months or other. Each of them has a different rhythm for their controlling and monitoring [12]. When some Continuous Assurance service signals an irregular transaction, and this is corrected by the auditor, the system becomes a proactive player in the processing of organizational information [12].

The objectives of Continuous Assurance, making it really advantageous, are divided into four levels. These four levels are difficult to define in a mutually exclusive form, but they serve to illustrate the functional dependence of Continuous Assurance on the audit [12]:

- **Level 1 (transaction evaluation).** At this level the main goals are: monitor and analyze the operations which constitute the execution of an organizational transaction; identify an irregular operation as soon as it occurs; verify whether, for each transaction, the operations have been correctly processed in all previous steps as required; detect lack of operations, and analyze the continuity and completeness of transactions.
- **Level 2 (measurement rule assurance).** At this level the main objective is the system being able to: verify the transactions which are being executed, or are already completely executed; verify fulfillment of requirements, rules, conditions or sequences previously defined for each of the monitored transactions.
- **Level 3 (estimate assurance and consistency of aggregate measures).** At this level the main objective is to: estimate which the result of the execution of a transaction based on the data set we have at present will be.
- **Level 4 (judgment assurance).** At this level it is considered as objective the system being able to allow extensive gathering of evidence, which provides crucial input into users’ judgments.

Moreover, Continuous Assurance is divided into three distinct, but complementary components [1]:

- **Continuous Controls Monitoring (CCM),** which consists of a set of procedures to monitor the operation of internal control mechanisms and verify whether they are consistent with the predefined rules. Besides the controls monitoring, it produces reports and performs analyses; it aims to reduce business losses from fraud or failure to follow rules on procedures governing transactions, and improves organizational performance.
- **Continuous Data Assurance (CDA),** which verifies the integrity of the data circulating in organizational information systems, comparing it with the expected behaviors and patterns, thus identifying anomalous situations and triggering alarms when they occur.
• Continuous Risk Monitoring and Assessment (CRMA), which is used to dynamically identify, assess and report the risk and allow to sustain an audit plan.

3. Evaluation model

The information systems with Continuous Assurance support, mainly implement CCM and CDA components. Despite trying to integrate the maximum possible features, the truth is that vendors still address only in CDA, because the implementation of CCM is time-consuming and expensive due to the diversity of business processes [1]. But currently, some information systems of this type, still under research, are appearing. These are offering features of Continuous Assurance which cover the three components, meet the majority of the four levels of objectives and provide benefits of Continuous Assurance [7, 14].

From the above discussion it is apparent the need of an evaluation model to assess and understand whether the system is indeed an information system with Continuous Assurance services. And that is done confirming if the system meets the main objectives of Continuous Assurance and covers the features of its components.

Analyzing the information from the previous section, Continuous Assurance can be divided into the following dimensions: Monitoring, Compliance, Estimation, Reporting and Continuous Assurance. These dimensions comprise all aspects mentioned in the objectives as well as in the components of a system with Continuous Assurance services. Thus, if we embrace these dimensions with the benefits of a system with Continuous Assurance we will have conceived a model able to be used to guide evaluation of a system with this kind of services.

Next, we explain the existence of each dimension and present some metrics which can be used to assess them and consequently support evaluation of information systems with Continuous Assurance.

3.1. Dimension Monitoring

The dimension Monitoring relates with the objectives of level 1, that is organizational transactions evaluation. It is also connected with the component CCM. Thus, analyzing the data allied with those objectives and that component, we can identify some metrics which allow to evaluate this dimension. Hence, these metrics must assess whether the system is able to:

• Monitor the various operations (which have controls embedded) of an organizational transaction as soon as they occur [8, 10, 12, 13];
• Identify an irregular operation (unforeseen or inconsistent with the predefined rules) as soon as it occurs [1, 13];
• Verify whether, for each transaction, the operations were processed at all the previous steps as required [1, 8, 13];
• Detect lack of operations [1, 8, 12];
• Assess the continuity and completeness of transactions [1, 12].

3.2. Dimension Compliance

The dimension Compliance has included the features of the component CDA and the objectives of level 2. After analyzing those objectives and that component, some metrics are given as examples of how to evaluate this dimension. These metrics assess the system about whether it is able to:

• Recognize which known execution pattern was or has been followed by each organizational transaction monitored [1, 12];
• Ascertain which rules, conditions and procedures were fulfilled and unfulfilled in the organizational transaction monitored [1, 10, 13];
• Detect potential errors [1, 12];
• Inhibit inappropriate events or behaviors [1, 12];
• Help compliance with existing laws, policies, norms and procedures [1, 10, 13].

3.3. Dimension Estimation

The dimension Estimation includes and covers the objectives of level 3 and the functions of the CRMA component. After analyzing data and the characteristics of that component and those objectives, we propose a set of metrics to evaluate this dimension. Thus, these metrics assess whether the system is able to:
• Estimate, given the current situation, what the possible results of the organizational transaction execution will be [1, 12, 13];
• Determine the execution pattern, or a set of execution patterns, which will be possible to be followed by the organizational transactions monitored, according with the current status of execution [1, 12, 13].

3.4. Dimension Reporting

For Reporting dimension we propose the following set of metrics which will enable to evaluate it. These metrics must assess whether the system is able to:
• Report the results of the monitoring of transactions [1, 10, 12, 13];
• Notify the results of the verification of compliance [1, 10, 12, 13];
• Inform the results of estimation [1, 12];
• Alert users of irregular situations in monitoring, compliance verification and estimation of negative results [1, 10, 12, 13];
• Allow the gathering of evidence, which provides crucial input for users' judgments [1, 12].

Therefore, it is patent that the features of all Continuous Assurance components and the objectives of all levels are included and covered by this dimension.

3.5. Dimension Continuous Assurance

Finally, the dimension Continuous Assurance intends to evaluate the benefits of Continuous Assurance, assessing whether the system:
• Improves the accuracy of corporate information processes [1, 12, 13, 15];
• Supports timely and accurate management and audit of processes and transactions [1, 10, 16];
• Improves the accuracy of operational transactions and processes, ensuring their compliance [1, 13];
• Increases confidence in transactions and operational processes execution [1, 10];
• Supports the decision making [1, 12, 17].

4. Conclusions

This paper describes the main objectives of Continuous Assurance and the features of its components, which can be encompassed into five dimensions. These dimensions define a model that allows to evaluate an information system with Continuous Assurance services. Additionally, some metrics are presented for each dimension giving an important contribution to support the development of an instrument of evaluation of this emergent kind of information systems.
Case studies in organizations of different economic sectors must be done in order to assess the feasibility of the model. Those case studies should comprise an implementation of an information system with continuous assurance services and after an established period, this evaluation model should be applied. The assessment process should be led evaluating the metrics through the results produced directly by the implemented system and through the users’ opinion about the perceived outcomes, collected by inquiring. Moreover, this assessment process will allow to find out possible correlations among the different dimensions.

In short, this paper contributes to understand how an information system with Continuous Assurance services can be evaluated. However, an empirical study must be undertaken for future work in order to validate this model.

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