The Social Sciences 11 (18): 4363-4367, 2016
ISSN: 1818-5800
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Towards Cloud-Computing Assurance

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Abstract: Cloud computing is a computing paradigm that is associated with various opportunities which could greatly benefit organizations if adopted and implemented in a manner that gives stakeholders the confidence that this is being done efficiently and in a manner that manages risks and is compliant with regulations. Simply put, organizations could benefit from some form of assurance when utilizing cloud computing in any possible form. Standards and reputable guidelines for the adoption of cloud computing and the use thereof could assist with cloud-computing assurance. This study has the three fold aim of: highlighting the responsibility of managers to ensure assurance when exploiting opportunities presented through IT advancesss such as cloud computing, serving to inform management about the advances that have been made and are being made, in the field of cloud-computing guidelines and to motivate that these guidelines be used for assurance on behalf of those organizations that adopt and use cloud computing.

Key words: Cloud-computing assurance, cloud-computing guidelines, cloud-computing standards, cloud computing compliance, efficiency

INTRODUCTION

The governance responsibilities entrusted to the board and executive management include the tasks of both recognizing and reacting to opportunities that could benefit the organization and doing so in a manner which such managers are reasonably confident is efficient, manages the risks effectively and is compliant with related the regulations and legislation. The field of cloud computing is one which illustrates and accentuates this responsibility.

This study will highlight the responsibility of managers to ensure assurance when exploiting opportunities presented through IT advances such as cloud computing), inform management about the advances that have and are being made in the field of cloud-computing guidelines and motivate that these guidelines be used for assurance purposes on behalf of organizations adopting and using cloud computing. For cloud computing to be used with confidence by organizations, managers need to be assured that they can do so in a manner that is effective, that the risks are properly managed and that the manner of use is compliant with regulations.

This study will thus, examine some cloud computing guidelines from an assurance perspective. Assurance is a critical component of governance since it involves having the required controls and mechanisms in place to make cloud computing work effectively, ensuring risk management and ensuring compliance with regulations. The recommendations available in existing guidelines in each of these areas of governance and assurance will be analysed and discussed. The manner in which the existing guidelines can be used to contribute to the comprehensive assurance of effective cloud computing will then be concluded.

Assurance as a governance responsibility: According to the Business Dictionary.com, assurance is defined as, "that part of corporate governance in which management provides accurate and current information to the stakeholders about the efficiency and effectiveness of its policies and operations and the status of its compliance with the statutory regulations". Assurance is also closely linked to confidence and trust. The international framework for assurance engagements describes an assurance engagement as: "An engagement in which a practitioner expresses a conclusion designed to enhance the degree of confidence of the intended users, other than the responsible party about the outcome of the evaluation or measurement of a subject matter against the criteria".

Figure 1 illustrates the relationship between: assurance, governance, confidence and compliance, as described above. As can be seen in Fig. 1, assurance is mandated by means of sound governance. Assurance is accomplished by analyzing the criteria and evidence about a subject matter. The criteria are determined, based on the subject matter but they are usually influenced by

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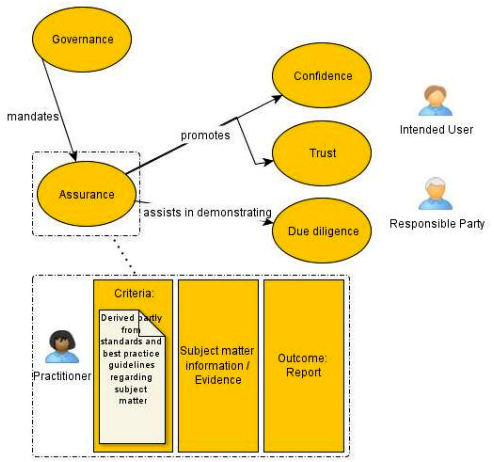

Fig. 1: Concept diagram for relationship between assurance and governance goes here

laws and regulations, policies and standards as well as the best-practice guidelines relating to the subject matter. The evidence of conformity with these criteria can also come in various forms, based on the subject matter under consideration but it but usually includes a set of controls and processes that ensure compliance and risk management. The outcome of the assurance process assists in promoting trust and confidence in the use of the subject matter. Done properly, the process of ensuring that organizations can provide appropriate evidence that they are meeting the criteria for a certain subject matter can also assists management in demonstrating due diligence. The importance of assurance, as a core component of sound IT governance is therefore clear.

A subject matter which is likely to impact many organizations internationally and for which assurance is therefore vital is cloud computing. The next section briefly introduces cloud computing and highlights the importance of management being aware of this computing paradigm and where it could possibly add value to their organization.

MATERILAS AND METHODS

Cloud computing: As stated earlier, the board and IT managers of an organization have the responsibility of recognising and acting on the opportunities presented by new developments in IT such as cloud computing (Solms and Viljoen, 2012). Cloud computing is already and is likely to continue having an impact on the environment in which organisations operate. It is associated with numerous potential business benefits. As such it is a computing paradigm which organizations should not simply ignore.

Consequently although, cloud computing is associated with many potential business benefits and should not be ignored by organizations, the use of cloud computing might not always be an appropriate solution.

Organizations should ensure that they only utilize cloud computing in a manner that is efficient, effective, secure and compliant with the regulations and that it adds value to the organization. Therefore, organizations should ensure that a service provided by means of cloud computing is indeed the best for them under the specific set of circumstance. It is for this reason that it is important for organizations to have a mechanism for ensuring cloud computing assurance. Failure to do so could be a governance oversight.

The value of standards and guidelines: Standards and best practice play an important role in assurance. As has been noted earlier, standards and best practice guidelines are important elements from which the criteria for assurance engagement are derived. By using these standards and best practice guidelines to derive assurance criteria, the assurance process can assist in demonstrating due diligence. Due diligence is defined as: "Those reasonable steps taken by a person to avoid committing a tort or offence" (OECD, 2004). As explained in the OECD principles for governance, persons can show due diligence by demonstrating that they have behaved in such a way as "a reasonably prudent person would exercise in similar circumstances" (OECD, 2004). Properly following a set of reputable guidelines by a group of experts, gives directors and managers the ability to possibly move towards due diligence. A standards-based, best practice based approach to the governance of IT is therefore, a wise course to follow.

Standards and guidelines for cloud computing, therefore, clearly add value to organizations. There are however, a plethora of cloud-computing standards and guidelines available. The next study elaborates on this and describes some reputable guidance available for cloud computing.

RESULTS AND DISCUSSION

Cloud-computing guidelines: As discussed in the previous section, guidelines for cloud computing can assist managers with the task of deciding how to proceed with cloud computing in their organization confidently. The sheer volume of guidance available for cloud computing may make the task of finding and selecting guidelines for the adoption and implementation of cloud computing more complicated than previously envisaged. This section aims to highlight how many different types

of cloud-computing standards and guidelines are available and it will then list some of the more applicable and reputable guidelines.

What is available?: There are various types of cloud computing guidelines available. These guidelines range from very specific to very general, from very technical to very conceptual. Borenstein and Blake (2011) highlight two types of standards: prescriptive and evaluative. They describe prescriptive standards, as those which give exhaustive details about how things work. Standards describing SMTP and TCP are examples of prescriptive standards. Evaluative standards, on the other hand, provide a uniform manner of assessing how well something works. For the purpose of this study, some evaluative cloud-computing guidelines will be discussed.

What will be considered?: Various IT governance bodies have been producing guidelines which have been used successfully for a number of years by organizations internationally. They have therefore, become reputable and trustworthy advisors in the field of IT. It would be wise to monitor any work in which these bodies would be involved, in this case with cloud computing specifically. Cloud-computing guidelines from bodies which provide reputable IT governance guidance can also easily be used in conjunction with the existing guidelines for IT governance which many organizations may already be using. In addition, guidelines from reputable IT governance bodies are relevant to the board and executive management. The guidelines from these bodies are not overly technical or technological or vendor specific. In addition, guidelines from these bodies are most likely to be adopted by organizations within the environment in which general organizations operate. Adherence to guidelines from these bodies may even be a mandate for their organization. Finally, as explained earlier, adherence to guidelines from such reputable bodies assists one in demonstrating due diligence, to some degree.

Synopsis of guidance: The guidance will be discussed from an assurance perspective. It has been previously highlighted that assurance is part of governance and that it involves the important facets of ensuring risk management and compliance with the standards. Since assurance is part of governance and many of the controls that affect cloud computing (such as policies, organizational structures and others) are mandated by governance, general guidance on the governance of cloud computing will be highlighted.

Understanding cloud computing: Since, cloud computing is a relatively new field in IT, it is not surprising that a good deal of the information from these bodies serves to clarify what cloud computing is and what potential benefits and risks are associated with cloud computing.

Once organizations understand what cloud computing is, how it can be used and what opportunities and risks are associated with it, they can embark on the process of deciding on the adoption of cloud computing. This is a second general area in which cloud-computing guidance is given. The following subsection summarises the guidance given in the selection and adoption of cloud computing.

Selecting cloud-computing solutions: Although, there are significant opportunities which are attributed to the use of cloud computing in general, each organization has the responsibility to investigate whether the adoption of a cloud-computing solution would be appropriate for an organization's specific circumstances and requirements.

Governance and assurance with cloud computing: Governance is defined by the ISACA as "the set of responsibilities and practices exercised by the board and executive management with the goal of providing strategic direction, ensuring that objectives are achieved and ascertaining that any risks are managed appropriately" (ISACA, 2011). The ISACA states that the two key objectives of IT governance are to ensure that IT is used in such a way that it adds value to the business and that IT-related risks are properly managed.

This study will highlight the various guidelines regarding enterprise governance of the cloud. This section, therefore, focuses primarily on the second main objective of IT governance for cloud computing: risk management.

General governance guidelines: Cloud computing must be governed within the context of an enterprise IT governance program using standards and best practice guidelines. To ensure that cloud computing is properly governed; the roles and responsibilities should be assigned to different levels of management. COSO provides a list of the responsibilities of various managers, such as the board of directors, the chief executive officer, the chief financial officer, the chief legal officer, the chief information officer and the chief internal auditor (ISACA, 2012a).

Organizations should establish business goals and business cases for cloud computing. ISACA provides a set of steps that organizations can use to determine their cloud-computing business goals.

Risk-management guidelines: Ensure that a system is in place to ensure that enterprise risks introduced by cloud computing are properly managed. Cloud computing

introduces a multitude of new opportunities and risks. All of the bodies considered in this study describe various opportunities and risks associated with cloud computing and they emphasise the need to address these risks adequately.

Compliance guidelines: ENISA gives a list of those areas to which to pay attention when assessing agreements in various forms (such as SLAs, ToUs) with CSPs (ISACA, 2012b). ENISA also provides extensive guidance on cloud-computing contracts. The guidance includes a checklist that organizations can go through, in order to assess and evaluate cloud-computing contracts with CSPs (Giles and Marnix, 2011).

Controls for cloud computing: ISACA defines a control as "The means of managing risk, including policies, procedures, guidelines, practices or organisational structures which can be of an administrative, technical, management or legal nature: this could also used as a synonym for safeguarding or ensuring the necessary countermeasures.

Some of the guidelines listed above have already highlighted controls that organizations should use for cloud computing. In fact, the guidelines themselves are controls. A discussion on controls may therefore, seem arbitrary here. Providing assurance when using cloud computing is an important responsibility which is not fully addressed by the guidelines considered thus, far, however.

Cloud-computing assurance: The discussion thusfar has highlighted what assurance is and how the existing guidance from various reputable bodies addresses the various components of assurance for cloud computing. According to ISACA (2011) though, there is no single framework that can be used for cloud-computing assurance. This study will highlight some of the shortcomings of possible assurance measures for cloud computing. A process which organizations can use towards assurance will then be briefly outlined.

As explained earlier, a set of criteria for a specific subject matter, based partly on best-practice guidelines, is a vital component of an assurance engagement. Criteria for assurance can differ in terms of the scope-based factors, such as the type of organization (CSP or cloud user) and the level at which assurance is being provided. Assurance can also be provided for different functionalities (ISACA, 2011). A process that organizations can use to develop a set of best practice based criteria for cloud-computing assurance which suits their specific needs, could, therefore, be valuable. Mapping cloud computing guidelines from reputable bodies to the components of a unified IT compliance could identify those criteria that could be used as a foundation for creating a best practice based assurance process for cloud computing. Policies, regulations and other factors should also be considered when using this approach to determining the criteria for a cloud-computing assurance engagement. Following an approach such as the one outlined above provides a basis that can be used in assurance engagements, to promote confidence and trust in the functioning of cloud computing in organizations.

Some important aspects of assurance, as depicted in Fig. 1 have been discussed in this study. Furthermore, the relationship between assurance and governance responsibilities for cloud computing has been highlighted. It has been argued that a process of mapping the requirements for cloud computing outlined in best practice guidelines and other sources (such as policies and regulations) to the components of a unified IT compliance approach could be used by organizations to determine an appropriate set of criteria which can be used as information on cloud computing which could be consistently evaluated. Using this approach, could assist management in having confidence and trust that cloud computing is used efficiently, effectively and compliantly with the set standards. This best practice based approach to cloud-computing assurance could also assist managers in demonstrating due diligence.

CONCLUSION

Cloud computing presents significant opportunities and risks of which organizations should be aware. To be able to adopt and use cloud computing with confidence, organizations require assurance that they can do so in a manner that is efficient, addresses the risks appropriately and demonstrates compliance with the correct standards. Managers have the responsibility of ensuring this takes place. Standards and guidelines play a valuable role in assurance. There are many guidelines on cloud computing. This study has highlighted some of these from reputable bodies which could benefit organizations when considering the adoption of cloud computing. This paper has highlighted how knowledge of best practice guidance from reputable bodies on the governance of cloud computing could assist organizations in determining a set of criteria for assuring the governance of cloud computing adequately.

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