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Business Review:
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Anton Ravindran and Farid Shirazi

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INTRODUCTION

In today's networked society, Information and Communication Technology (ICT) plays an important role in economic growth. It is assumed that ICT expansion improves the efficiency of the industrial infrastructure by enhancing business activities, strengthening the competitive capacities of firms and improving the efficiency of governments, as well as enhancing the provision of education and health.

ICT has also had an enormously positive impact on organizational structures in areas such as education, R&D, health, and business. For example, ICT enables firms to redistribute their organizational structures in terms of flattening hierarchies, delegating responsibilities and reengineering business processes. As such, the "New Economy" is also referred to as the "post-industrial society," the "information society," the "innovation economy," the "knowledge economy," the "network economy," the "digital economy," the "weightless economy" and the "e-conomy" (Cohen et al., 2000). Each of these terms emphasizes different aspects of structural change, but each of them is vulnerable to misinterpretation (Pohjola, 2002). However, the core argument of the New Economy focuses upon the intensive use, production, and adoption of ICTs, both as outputs from ICT-producing industries and as inputs into ICT-using industries (Pohjola, 2002). In this context, organizations normally choose ICT tools and applications to promote their business, taking up opportunities offered by the adoption of new technology. This selection is also made as a response to dissatisfaction with old procedures and practices. Dissatisfaction can arise as a result of the perceived deficiencies of existing systems or as a result of a comparative evaluation with better systems. Thus, deficiency is the inability of a system to respond to the challenges introduced by technological change. The new technology also presents challenges to firms and organizations with respect to global market competition. Sciadas (2006) argues that the empirical evidence strongly supports the claim that the diffusion and appropriate utilization of ICT not only presents enormous opportunities for economic and social development, but also that its absence seriously threatens the sizable gaps that exist between the 'haves' and 'have-nots' in the so-called 'digital divide'.

This book discusses some of the new empirical evidence regarding the opportunities and challenges offered by the new technology.

In Chapter 1, Ravindran discusses how emerging Cloud technology is reshaping the existing computing landscape and the impact this is having upon enterprises. He argues that Cloud Computing is neither a new nor a revolutionary technology, but rather that it is a new paradigm with the capacity to enable new business models, new opportunities and new revenue streams. The chapter discusses the main characteristics and implications of Cloud Computing for businesses today. Chapter 1 also highlights the challenges and risks associated with Cloud Computing, including issues related to security, privacy and compliance. In Chapter 2, Rickards and Ritsert compare and contrast traditional static controlling tools with newer and more dynamic tools, by analyzing the results presented in several surveys. Their study focuses mainly on the implementation of rolling planning instruments. The authors propose a twelve-point strategy for controllers, which could facilitate the adoption of rolling planning instruments, particularly in small and medium-sized enterprises (SMEs). In Chapter 3, Zimmer, Pede and McKenzie analyze the major issues surrounding price volatility in grain markets. They provide a benchmark pricing structure according to which these products could be evaluated and initially priced, prior to auction and exchange. In Chapter 4, Stávková, Žufan and Birčiaková analyze the standard of living in five selected EU countries (the Czech Republic, Finland, France, Spain and the United Kingdom) by measuring income disparity and poverty issues, as well as government spending on social protection. In Chapter 5, Devalle and Rizzato discuss a range of different research approaches used in evaluating the quality and reliability of firms' disclosures of annual reports and financial statements.

In Chapter 6, Tarus discusses the demographic characteristics and firm outcomes for predicting the Top Management Team (TMT) characteristics in firm performance. Drawing upon various theoretical perspectives, the chapter discusses whether there is a business case for diversity or merely rhetoric. In Chapter 7, Kesti and Syväjärvi discuss the important role of Human Resources Management in increasing performance and productivity. Using the action research approach, they argue that improved human competences, in the form of better and more effective information management, may lead to growth in organization revenue. In Chapter 8, Abdelrahim discusses the importance of knowledge management in minimizing the digital gap among Arab countries. In Chapter 9, Bava and Devalle discuss the role of Information Systems in protecting data and in ensuring the reliability of financial information, from a managerial and

internal control perspective. Finally, in Chapter 10, Shirazi discusses the bi-directional relationship between ICT development and the growth of Foreign Direct Investment (FDI), through a comparative study of emerging regions, namely Asia-Pacific and the Middle East.

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CHAPTER ONE

EMERGING CLOUD COMPUTING PARADIGM AND ITS IMPACT ON ENTERPRISES

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Abstract

The increasing rate of growth, change and significance of information technology shows no sign of slowing. Cloud Computing has emerged as a new approach in computing, and its data centres are growing at an unprecedented rate. This has attracted a lot of attention from the scientific, research and business communities. Cloud technology represents an evolution and a shift away from the traditional IT paradigm. Many scholars have argued that the Cloud Model is evolutionary, while a few others have suggested that it is revolutionary and that computing will become the fifth utility. This chapter investigates how this emerging Cloud technology is reshaping the existing computing landscape, and the impact this is having on enterprises.

Keywords: *Cloud Computing, Business Strategy, IT Strategy, Strategic Alignment, Transformation, Innovation, Elasticity, Scalability, Disruptive Technology, Utility Computing.*

Introduction

The new normal is rapid change. In a relatively short time span, computers and communications technology have helped to create modern global markets and the digital economy. This process, driven by IT leaders, has resulted in an explosion of communication and collaboration, and to a level of access to information which is unprecedented in the history of mankind. There is no doubt that the emerging technological development of Cloud Computing, which some argue is revolutionary and others claim is evolutionary, can only bring new dimensions, unique experiences and value propositions for enterprises.

'It is not the strongest species that survive, nor the most intelligent, but the ones most responsive to change' (attributed to Darwin). In the 'New Economy' (a term which refers to the impact of IT on the economy, introduced on the basis that conventional measures of value are no longer valid due to rapid changes in the market driven by the internet and advances in technology), everything changes faster. McCallum (2001) said 'enterprises that do not adapt are in for a lot of trouble. The problem is change: The more rapid the pace of change, the direr the consequences of stubbornly sticking to old ways'. According to Vega-Gonzalez (2005), technological developments have divided human history into six different time periods. The era of technological revolution began with the advent of printing, and the second resulted in the advent of the steam engine, electricity and industrial technology. This was followed by the first phase of the third era, driven by electronics, software and communications technologies (Vega-Gonzalez, 2005). We are now living in a period of transition between the Information Age and the Cyberspace Age, which Vega-Gonzalez considers to be the second phase of the third technological revolution, in which information is the driver of change. This new technological development will perhaps be more significant than any of those which preceded it.

Throughout the annals of history, there have been various forms of disruptive technology. Any new technology which has a serious impact on the status quo, and which revolutionizes the way we live and work, is disruptive (Christensen, 1997). From the electric light to the automobile, history is filled with examples of new technologies which have changed the way in which people live, conduct commerce and run their governments. Peha and Strauss (1997) state that 'Computing technology, which stores and processes information, has been growing at a phenomenal rate'. Driven by information technology, the rate of change continues to accelerate. Peha and Strauss (1997) go on to state that 'every

few years, ICT innovates beyond recognition'. Every three to five years, our understanding of ICT tends to change dramatically, as new assumptions and ideas are accepted, and what was previously considered esoteric becomes accepted as common knowledge. We are living through a transitional period between the Information Age and the Cyberspace Age, and Vega Gonzalez (2005) claims that 'this new technological revolution will perhaps be bigger than all previous ones'. IT, which is the most important commercial and technological development of the last four to five decades, is undergoing a significant transformation, from being an asset procured by companies to being a service procured from vendors. According to Carr (2005), the shift from a 'fragmented capital asset to a centralized utility service will be momentous'. The Cloud Model is likely to alter the existing computing paradigm and to affect users, vendors, enterprises and markets (Carr 2005).

Trends in IT Spending and Growing Importance of IT

The increasing rate of growth, change and significance of information technology shows no sign of slowing. According to Gartner Dataquest's (2012) statistics, in April 2002 one billion computers were shipped, and by April 2012 this figure had risen to two billion. Therefore, while it took nearly twenty-seven years to reach the one billion mark, there has since been a rapid acceleration, and the figure has doubled in only ten years. At the same time, the cost of memory has dropped from US$ 10,000 in 1956 to US$ 1.26 in 1996 and to US$ 0.08 in 2010 (Wikipedia). On January 12, IBM (Computer World, 2012) announced that after five years of work, its researchers had been able to reduce the number of atoms required to create a bit of data from one million to twelve. In the meantime, wireless and mobile applications are setting the stage for a further upsurge in penetration and in the importance of ICT, and this will change the way we compute and how businesses compete.

According to the latest study by Gartner (2012), spending on Information Technology by organizations reached $ 3.68 trillion in 2012. Gartner's (2012) study, of 175 board members of companies with more than $ 250 million in annual sales, found that 64% of the respondents said they planned to increase their investments in IT, despite the gloomy market outlook. 50% of the directors interviewed agreed that IT was the way to change the competition.

The growing complexity of Information and Communication Technology (ICT), and its inherent strategic importance in the success or failure of any business, poses new challenges for managing the delivery of

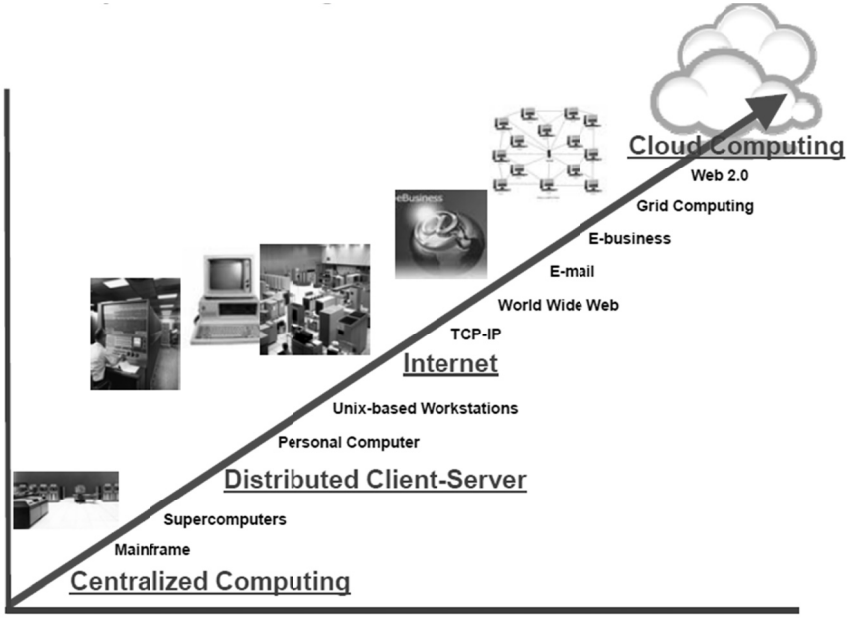
IT solutions. It is the goal of every purchasing decision made in IT today to be faster, cheaper and better. There is no doubt that IT has become the engine of growth for business: it underpins business operations, ties together far flung supply chains and, increasingly, links businesses to the customers they serve (Carr, 2003). Hence, IT departments, headed by the Chief Information Officer (CIO), are faced with a growing responsibility to manage these rapid changes and to leverage from technological advances.

ICT has shifted from being an asset owned by companies, in the form of hardware and software, to being a service purchased from service providers (Carr, 2005). Studies show that this shift has been making gradual progress over the past two decades. According to IBM, 'the trend toward Cloud Computing started in the late 1980s with the concept of grid computing when, for the first time, a large number of systems were applied to a single problem, usually scientific in nature and requiring exponentially high levels of parallel computation' (cited in Sharma, 2009). Many analysts forecast growth rates for Cloud Computing in excess of 20% to 30% year on year, and Gartner has predicted that the market for Cloud Computing services will grow to over $ 150 billion by 2013. However, according to Kesner (2003), 'The vendor community and at times IT leadership tend to oversell the value and understate the required investment and difficulties in enabling IT to bear'.

Twitter is a good example of a start-up that has fully leveraged from Cloud Computing in reaching out to its global audience. Carr (2005) and others have envisaged that Web and Cloud will lead to a 'World Wide Computer—Compute from anywhere' paradigm. The Cloud Model is expected to make computing a lot less expensive (Braiker, 2008; Wyld, 2009; Armbust et. al., 2009) and to provide access to computing resources, for individuals and enterprises, without having to make capital investments in infrastructure, resources and maintenance.

The term 'Cloud Computing' originates with the cloud symbol which is often used to represent the Internet in diagrams. The underlying concept of utility computing dates back to the 1960s, when the American computer scientist Herb Grosch envisioned that 'computation may someday be organized as a public utility'. The first academic definition was provided by Chellappa (1997), who said that Cloud Computing 'is a paradigm where the boundaries of computing will be determined for economic rationale rather than technical limits'.

Figure 1: Growth & Evolution of Computing



Adapted from IBM, 2010

What is Cloud Computing?

The following sections will examine several developments in cloud technology, including deployment models, drivers, challenges, and impact. Firstly, is it Outsourcing 2.0—a new technology, or a new business paradigm? Cloud computing is a new way of delivering computing resources and applications on demand via the internet, with the ability to scale dynamically across shared resources. It is therefore different from outsourcing. Bohm et al., (2011) state that 'Cloud Computing is sometimes used to refer to a new paradigm—some authors even speak of a new technology—which offers IT resources and services over the internet'. IDC defines Cloud Computing as 'an emerging IT development, deployment and delivery model, enabling real-time delivery of products, services and solutions over the Internet' (cited in Hugos & Hulitzky, 2011). The analogy often used to describe the Cloud Model is that it is like buying electricity instead of self-performing, self-developing or self-generating. According to Kern and Willcocks (2002), outsourcing is a

relationship between a client and a supplier, where the former contracts or purchases IT services from the latter (cited in Bergkvist & Fredriksson, 2008). However, whilst the Cloud Model and outsourcing both involve the procurement of IT services from a supplier, there are significant differences.

The difference between Cloud Computing and outsourcing can be best illustrated by examining the challenges which outsourcing faces (Bohm et al., 2011). On the one hand, customers expect cost-effective, efficient and flexible delivery of IT services from their service providers. Alongside advances in technology, customers are now also demanding innovation, personalization and customer-specific innovation from service providers. Advances in technology have been the driver for the shift from the traditional manufacturing 'one-size-fits-all' mass production model to 'today's consumer–mandated, consumer-producer value co-creation model towards a mass customization model' (Shih, 2006). Unlike outsourcing, Cloud Computing aims to provide a technical basis which meets the consumer demand for flexibility. It achieves this by providing services on a needs basis, for which customers pay based on their usage. This emerging model of computing and service procurement is having a significant impact on how IT services are procured and consumed by enterprises.

In addition, unlike the outsourcing model, according to which physical infrastructure and resources are kept by the customer or service provider, Cloud Computing is a model for the flexible and virtual asset-free provision of IT resources and services. To that end, Bohm et al. (2011) opine that Cloud Computing can be considered as the 'consequent evolution of the traditional on-premise computing spanning outsourcing stages from total to the selective, and from multi-vendor outsourcing to asset-free delivery'. In fact, Cloud service providers provide essential data centres for outsourcing vendors as well. Lastly, in contrast with outsourcing, the Cloud Model is an on-demand and highly scalable pay-per-use model.

Definitions and Key Features of Cloud Computing

Although various definitions of Cloud Computing have been proposed, most researchers agree that the Cloud Computing model encompasses a general shift in computer processing, storage and software delivery, and moves away from the desktop, local servers and leverages from the internet. Instead, Cloud Computing delivers services by leveraging from

next generation data centres hosted by large infrastructure companies such as Amazon, Yahoo, Google, Microsoft or Sun (Abadi, 2009).

Cloud Computing represents a new paradigm shift from computing-as-a-product to computing-as-a-service. This is a transition from buying hardware and software as products which are installed, configured, used and maintained to treating computing infrastructure and applications as services to be paid for only when used. Rehman and Sakr (2011cx) state that Cloud Computing 'is a disruptive technology, in that it embodies a major conceptual shift and is rapidly changing the way developers, users, and organizations work with computing infrastructure'. They claim that this will have a significant impact on how IT is procured and consumed.

According to Armbust et al. (2009), Cloud Computing refers to computing services delivered over the internet to the computing infrastructure in the data centres which provide these services. These services are known as Software as a Service (SaaS). The data centre hardware and software is called a 'Cloud'. When Cloud services are made available to the general public via the internet on a pay-as-you-go basis, this is known as a Public Cloud, and the services sold are known as utility computing. A Private Cloud refers to a business or an organization's internal dedicated data centre. Hence, Cloud Computing is the sum of SaaS and Utility Computing, though this does not include Private Clouds. In contrast, Vaqueo et al. (cf. Bohm et al., 2011), claim that Clouds are a large pool of easily accessible and virtualized resources, such as hardware, development platforms and/or services. These resources can be dynamically reconfigured, in order to adjust to a variable load and to meet the specific requirements of customers. This pool of resources is typically offered on a pay-per-use model, in which guarantees are offered by infrastructure providers by means of customized SLAs. On the other hand, the National Institute of Standards and Technology (NIST, 2011) defines Cloud Computing as a model for enabling convenient, on-demand network access to a shared pool of configurable computing resources (e.g., networks, servers, storage, applications and services), which can be rapidly provisioned and released with minimal management effort or service provider interaction.

Although there are a range of existing definitions, the majority of authors agree that the key features of Cloud Computing are the following: service, hardware, software, scalability, pay-per-use and internet. This is shown in Table 1, which summarizes the key features of Cloud Computing as these are defined by a range of authors.

Table 1: A comparison of various Cloud Computing definitions

Author	*Service*	*Hardware*	*Software*	*Data*	*Development Platform*	*Pay Per Use*	*Off Premise (Public)*	*Scalability*	*No Upfront Commitment*	*Virtualization*	*SLA*	*Deterministic Performance*	*Internet /Network*	*Automation*
Armbust et al	*X*	*X*	*X*			*X*	*X*	*X*	*X*				*X*	
Breiter/ Behrendt	*X*	*X*				*X*		*X*		*X*				*X*
Briscoe/ Marinos	*X*	*X*	*X*					*X*		*X*			*X*	
Buyya		*X*						*X*		*X*	*X*			
Foster et al	*X*	*X*		*X*				*X*		*X*			*X*	
Gartner	*X*	*X*	*X*		*X*			*X*					*X*	
Gorssman /Gu	*X*	*X*		*X*									*X*	
Gruman/ Knorr	*X*	*X*	*X*		*X*								*X*	
IDC	*X*	*X*				*X*		*X*					*X*	
Kim	*X*	*X*	*X*	*X*		*X*		*X*					*X*	
McFred-ries	*X*	*X*	*X*	*X*						*X*				
Nurmi et al	*X*	*X*	*X*					*X*				*X*		
Vaquero et al	*X*	*X*			*X*	*X*		*X*		*X*	*X*			
Vykoukal	*X*	*X*				*X*		*X*					*X*	
Wang et al	*X*	*X*	*X*	*X*										
Weiss	*X*	*X*	*X*					*X*						
Youseff et al	*X*	*X*			*X*	*X*		*X*		*X*	*X*			

Source: Bohm et al., 2011

Characteristics and Implications of Cloud Computing

Hardware, software and applications have previously been run on an 'ownership' model, and have been treated as capital expenditure requiring investment in infrastructure, implementation, training, ongoing maintenance and, every few years, additional investments in upgrades and platform migration. This has been considered to be the responsibility of IT departments. This traditional model of development and deployment of IT applications has been facing problems related to cost and time overruns. A recent study by Flyvberg and Budzier (2011) reported that a US $ 5 million project to implement SAP led to a $ 192.5 million loss at Levi Strauss, which resulted in the termination of its Chief Information Officer (CIO)'s contract. Flyvberg and Budzier (2011) go on to state that the average cost overrun stands at 27%, with the average schedule overrun standing at approximately 70%. One of the key benefits of Cloud Computing is that it spares companies from having to pay for underutilized resources (Hofmann and Woods, 2010).

The Cloud Computing model can help enterprises and their IT departments to address these challenges. As the Cloud is based on a pay-per-use model, it not only shifts the risk to the service provider, but also allows the customer to purchase computing resources based on need, thus providing elasticity of resources. In the Cloud Model, computing resources are not capital expenditure but operating costs. Thus, Cloud Computing has eliminated huge upfront investments in computing infrastructure, and has allowed business to scale up quickly. This emerging paradigm has the potential to transform a large part of the IT industry. It is likely to make software which can be purchased as a service based on demand more attractive, while reshaping the way IT hardware is designed and purchased (Armbrust et al., 2009).

Deployment Models of Cloud

The Cloud Model presents enterprises with various deployment options. This section will briefly outline the widely accepted Cloud deployment models.

Private Cloud: These are Clouds provided, operated, managed and maintained exclusively for a specific organization. The term 'Private Cloud' refers to an internal data centre which is not publicly accessible (Armbust et al., 2009). Large organizations are likely to see the Private Cloud model as the most logical one for the purposes of mission critical

applications and sensitive data. According to a recent study in the UK, reported in CIO magazine (2012), CIOs are in agreement that enterprises are now beginning to leverage from the Private Cloud model, which has now reached maturity.

Public Cloud: This is the most common and widely known form of Cloud. A Public Cloud is accessible to anyone, and its infrastructure and applications are owned by the service provider. The key challenges for a Public Cloud are security and control (Shekhawat and Sharma, 2012)**.** As such, SMEs and start-ups have been the first to adopt this model, while large enterprises have leveraged the Public Cloud for 'non-core' business functions.

Community Cloud: These Clouds are optimized for use by particular industry sectors, such as financial or health care services, or by groups of users seeking to meet specific objectives such as mission, policy, compliance or security requirements.

Hybrid Cloud: These Clouds combine of two or more of the above Cloud Models (Private, Public and Community). This model allows for selective implementation, and may be used to address issues relating to security, compliance and loss of control, whilst at the same time enabling the adoption of Public Clouds which offer cost benefits and further application options. According to Kundra (2010), a U.S CIO, this model provides the best of both worlds—the security of the Private Cloud and the cost benefits of the Public Cloud.

Distinct Levels of Cloud Values

Dean and Saleh (2009, of the Boston Consulting Group (BCG) have identified three distinct levels of value in Cloud Computing. According to their observations of customers, each level builds upon the previous one, and requires a shift away from current business processes. Each level also leads to value creation which is much greater than at the prior level.

Utility Level: This is the basic level of Cloud, where enterprises benefit from the pay-per-use model and from lower costs and higher levels of service, which may not be otherwise available. Although small and medium enterprises (SME) and start-ups have been the early beneficiaries of Cloud Computing, large companies and even public sector organizations are beginning to leverage from applications such as email

and calendar services (Hofmann and Woods, 2010). Dean and Saleh opine that CIOs and their IT departments are now able to spend less time worrying about 'keeping the business running' and to allow IT staff to focus more upon improving the features and the functionality of applications. This allows the CIO to focus on strategic initiatives and to work on transforming the organization.

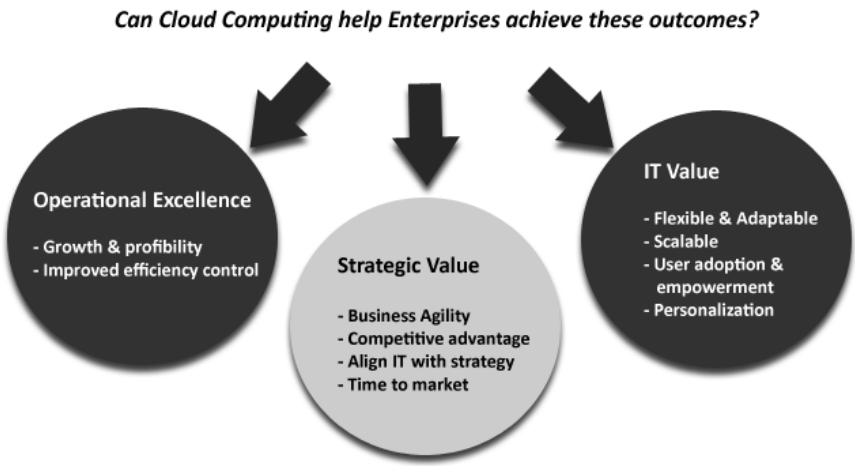
Process Transformation Level: Dean and Saleh (2009) say that CIOs and IT departments can play a role in introducing new and improved business processes by leveraging from the elasticity and collaborative nature of the Cloud Model. Legacy systems often lack standardization of applications and data formats, and this has resulted in inherent inefficiency. The Cloud Model, which embraces standards, will lead to process transformation and efficiency across the organization (Dean and Saleh, 2009).

Business-Model-Innovation Level: By leveraging from access to resources, the Cloud Model could lead to the next generation of innovative business models and reshape existing ones, resulting in extensive collaborative efforts with partners, suppliers, distribution channels and customers (Dean and Saleh, 2009).

Benefits and Challenges of Cloud Computing

Cloud computing offers a slew of benefits to users, both individuals and enterprises. However, it also presents challenges and poses risks. By embracing and deploying Cloud Computing, enterprises can leverage from its benefits while ensuring that these risks and limitations are addressed. The diagram (Figure 2) below identifies three key areas in which enterprises could leverage by embracing the emerging Cloud Model. These are (a) Operational Excellence (b) Strategic Value and (c) IT Value.

Figure 2: Key sets of Values to Enterprises



Benefits of Cloud Computing

A Public Cloud eliminates significant capital expenses on computing infrastructure, upfront license costs, maintenance costs, migration costs and upgrade costs (Brynjolfsson, Hofmann and Jordan, 2010; Hofmann & Woods, 2010; Wyld, 2009). Cloud applications can be deployed instantly and simultaneously to thousands of geographically dispersed users. Developers can experiment and test new and innovative ideas without having to invest in infrastructure. Cloud Computing offers scalability and elasticity which meets on-demand peak and seasonal computing resources (Hofmann & Woods, 2010). The Cloud has opened up a world of opportunities for big and small enterprises alike (including individuals) by providing access to computing resources without the need to implement, administer, maintain or buy those resources, and this has increased business agility. The key features and drivers of the Cloud Model are depicted in Table 2 below.

Table 2: Features & Drivers of the Cloud Model

Features	Flexibility On-demand elasticity Scalability Compute from anywhere, location independence Self-service IT Elimination of maintenance, upgrades and migration of applications No update disruptions Enhanced security for SMEs
Business Benefits	On-demand provisioning /buy or release on demand Virtual/mobile Access—'compute anywhere' Business Agility Reliability through redundant sites Ability to easily meet evolving IT requirements Immediacy—quick to deploy applications Effective utilization of resources
Economic Benefits	No or low capital investment No or low running cost Utility-based, pay-as-you go model No need pay for underutilized resources No long term contract/commitments

Challenges and Limitations of Cloud Computing

Is the utility analogy accurate for Cloud Computing? There are concerns about the Cloud Model, and general challenges associated with data security and the risk of unauthorized access to customer data, proprietary information, trade secrets and classified information, as well as concerns about system availability and business continuity. It is a fact that running Cloud applications results in ceding control to the service provider as regards the protection and location of the data. Although some researchers (Carr, 2005) have argued for the vision of computing becoming the fifth utility, the fact that Cloud Computing simply cannot achieve the same

plug-and-play simplicity as electricity and security is one of the greatest challenges to the model. Hofmann and Woods (2010) argue that the utility analogy doesn't hold true, as most enterprises don't spend any time worrying about whether electrical wires are being compromised. In contrast, a violation of data security is a serious concern for an organization. However, for small and medium enterprises, with limited resources and skills sets, data may be more secure with a cloud service provider than if it is held at the organization's premises.

The other major concern affecting the deployment of a Cloud is that it should meet the compliance standards of legislative requirements, such as Sarbanes-Oxley (SOX) in the US, and the Data Protection directives of the European Union (EU) (Hofmann and Woods, 2010). While data protection requirements in the EU are consistently applied across its member countries, in the US data protection requirements can vary from state to state. In fact, these issues are slowing down the deployment of Cloud services, though many organizations have adopted the hybrid model in order to address these concerns (Wyld, 2009).

Hoffman and Woods (2010) argue that 'as long as we rely on fiber-optic cables, we're limited by network speed' and that the transfer of large volumes of data using Cloud technology has resulted in a bottleneck. Cloud technology has therefore been found unsuitable for business applications such as stock trading, where a large amount of data needs to be transferred with great speed and with split-second precision. Bryanjolfsson, Hofmann and Jordan (2010) opine that infinite elasticity and scalability remains an unattainable goal in the foreseeable future, as Cloud Computing isn't simply a matter of adding an infinite number of servers. Some problems and processes cannot be solved by adding more servers, as these require different architectures for processing, memory and storage. RDBMS applications are widely used for major business applications. These database systems face limitations, as they are unable to write concurrently on two different nodes. As such, Hoffman and Woods (2010) highlight the fact that it is difficult for high volume mission critical applications to run using Cloud technology. However, they suggest that Cloud technology could be revolutionary for start-ups and for small and medium enterprises.

In addition, there is a lack of standards, as well as other technical limitations. For example, Hofmann and Woods (2010) state that Cloud providers speak different languages, and that all the major vendors of storage, such as Amazon's Dynamo, Google's Big Table and Facebook's Cassandra, are proprietary applications,

Given that there is no scientific solution for scalable relational database management systems (RDBMS) as yet, this leaves no option but to choose between proprietary storage and the huge challenges faced by interoperability (Hofmann and Woods, 2010). In contrast with the case of electricity, the different Cloud platforms and applications are not necessarily interchangeable and interoperable. In the case of an electricity grid, a customer can plug in without having to be concerned about the power supply. Furthermore, Cloud penetration is also hampered by a lack of uniform standards, although efforts have been undertaken by The Open Grid Forum to develop an Open Interface, and there are ongoing efforts by the Open Cloud Consortium to develop Cloud Computing standards and practices.

Cloud Computing technology is a means to an end, not the end itself (Muller, 2011; Wyld, 2009). Today's CIOs and their IT departments are expected to deliver more than the development and implementation of the latest technologies: they are expected to deliver measurable business value. Increasingly, technology is becoming a commodity. Goldstein (2008) offers a very thought-provoking and somewhat pragmatic assessment of the Cloud Model, and he highlights the fact that the model is able to free CIOs from constant worries about IT investments, thereby presenting an opportunity for CIOs to focus on more strategic issues and to play a different role, devising novel ways to take advantage of Cloud technology. The benefits of the Cloud Model to enterprises are significant. However, as Muller (2011) highlights, it is unlike other utilities because it is not a one-size-fits-all solution. Hence, companies and CIOs will need to develop unique strategies, in line with their business objectives, in order to fully leverage from the cloud model.

Conclusion

The Cloud Model has been widely accepted as a paradigm of new technology in the literature, and it is fast gaining prominence in the industry. It has been suggested by some that the Cloud Computing model shows the potential for disruptive evolution, in terms of how enterprises have leveraged from technologies such the internet over the past two decades. It is evident that the rate of change and ubiquity of computing is showing no sign of slowing. The exponential growth of mobile applications and social media are generating new data and information at an astonishing speed and an unimaginable magnitude. According to Gartner, the Cloud Computing services market will reach over $ 150 billion in 2013. Cloud Computing is a paradigm shift in ICT which has

begun to alter the computing model, to increase business agility and scalability and to increase access to computing resources (storage, communication and processing) for both enterprises and individuals. The unique aspects of Cloud Computing, such as its provision of access to unlimited computing resources, pose new challenges and security risks. By implementing appropriate controls and by applying due diligence, Cloud Computing has the potential to offer significant benefits to enterprises and to transform businesses in ways which are as yet unheard of and still to be conceived.

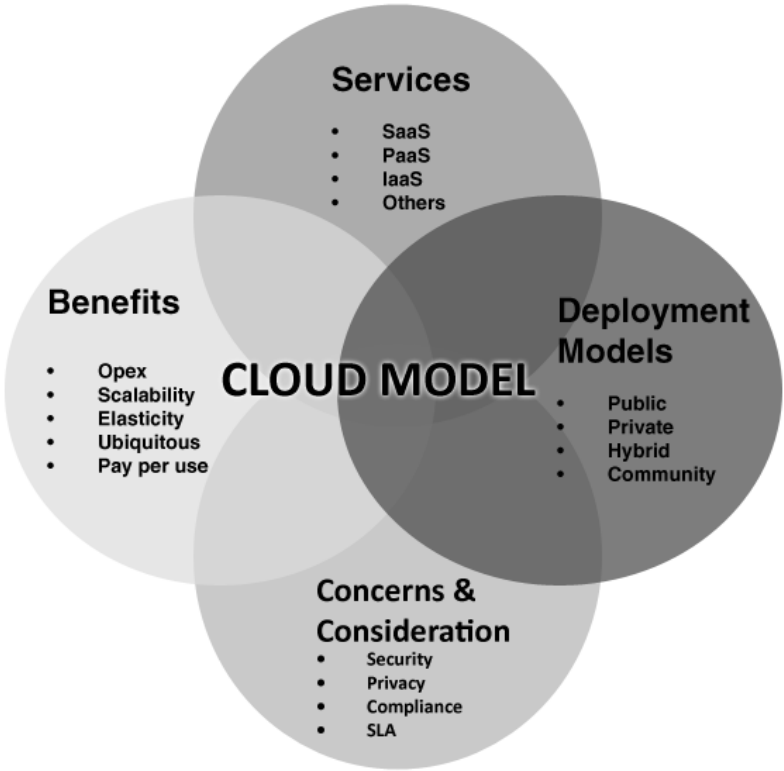


Figure 3: An Overview of Cloud Model

In summary, it is evident that the Cloud Model offers significant benefits. It is indisputable that it has proven to be a major commercial success and that it will continue to evolve. It also poses challenges and has limitations. There is universal agreement about the power of Cloud Computing and its potential impact on enterprises, in spite of concerns about privacy, security, control and lack of standards. Cloud Computing will uncover and unleash new growth and revenue opportunities for businesses. Cloud Computing is neither a new nor a revolutionary technology, but a new paradigm which will generate new business models, new opportunities and new revenue streams. It presents new challenges relating to security, privacy and compliance. In order to operate securely in the Cloud, enterprises must ensure that service providers deploy aggressive security and risk management solutions. There is a need for heightened due diligence in identifying and selecting service providers, with regular reviews of privacy and IP policies, security measures and disaster recovery plans. There is also a need to carefully evaluate and manage contractual transfers of risk through indemnities and warranties.

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CHAPTER TWO

CONTROLLER'S PERSPECTIVE ON IMPLEMENTING ROLLING INSTRUMENTS

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Abstract

The business environment's increased volatility following the 2007-2009 financial crisis has forced many enterprises to rethink their approach to planning. Advocates of rolling planning instruments believe they are superior to traditional, static tools, especially given their ability both to signal and to respond rapidly to environmental change. Yet only a minority of enterprises employs them. By analyzing results from several surveys, this study briefly compares and contrasts traditional, static controlling tools with their newer, more dynamic counterparts. It then considers why many enterprises so far have failed to implement rolling planning instruments. The study concludes with presentation of a 12-point-strategy controllers and management accountants could use to facilitate their adoption, particularly in small- and medium-sized enterprises (SMEs).

Keywords: *business drivers, controlling, forward visibility, rolling budgets, rolling forecasts, scenario analysis*