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Cloud Computing Integration for Business

The case of Meri-Lapin Majakka Ry

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ABSTRACT

The advancements in information technology have led to increased levels of automation which have greatly improved the methods of working. These advancements have led to the concept of cloud computing which is a new concept in the information communication and technology field that has created a lot of buzz. This work entailed development of a framework for Meri-Lapin Majakka Ry that will provide them with a new means of conducting their business by utilizing the Cloud. This research involved identification of the key factors to consider before moving to the Cloud. Additionally, the advantages of Cloud Computing and the security concerns when one's information is stored and managed in the cloud are also discussed. Finally, a discussion on the integration concerns and how Cloud Computing solutions can be integrated into the normal business functions.

A combination of descriptive and exploratory research was utilized in this work. The choice was based on the fact that the researcher intended to gain a greater understanding and provide a detailed picture of CC and the issues to consider when moving information to the cloud. Exploratory research also allows development of ideas and freedom to express opinions. Descriptive research will be used to develop a framework of working for Meri-Lapin Majakka Ry which may lead to a change and/or improvement in their business functions and processes by utilizing cloud computing.

The result of this work is a proposed scenario of how various Cloud-based solutions can be utilized within the case of organization. This implies a change in their working methods which could have a significant impact on the association and her work.

Keywords: Cloud Computing, SMEs, Integration, Security, SaaS, SOA

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1 INTRODUCTION

Cloud computing (henceforth CC) is a new model of computing that is widely being utilized in today's industry and society (Hartig, 2008). According to Hartig (2008), CC is a recent concept and one of the latest computer industry buzzwords and there has been a lot of talk around it. There is no universally accepted definition of CC, but it generally refers to accessing computing resources that are typically owned and operated by a third-party provider on a consolidated basis in one, or usually more, data center locations. CC is aimed at delivering cost-effective computing power over the Internet.

The National Institute of Standards and Technology's (henceforth NIST), states that "CC is a model for enabling convenient, on-demand network access to a shared pool of configurable computing resources. These are networks, servers, storage, applications, and services that can be rapidly provisioned and released with minimal management effort or service provider interaction". (Mell & Grance 2009.) This is the definition that is most frequently used and referred to when defining CC.

According to F5 Networks, "the information technology (henceforth IT) infrastructure is important to the success of virtually any business initiative, from quickly integrating a strategic acquisition to bringing products to market cost effectively". (Sanforce's Partners 2011.) The continued influence and innovation in leveraging the Internet has brought more advanced methods of working leading to faster consumption and processing of information which is enabling the CC drive.

CC is a whole new form of computing and allows numerous users across the globe to access information without having to download and install anything on their own computers. An example of this would be Google Docs which enables one to access and work on their documents entirely online. The backdrop to utilizing the capabilities of Google Docs is having an Internet connection. Google Docs has similar functionalities to Microsoft Office, but does not offer all the applications and services that are available in the latter.

1.1 Purpose of the Study

The purpose of this work is to carry out a study of the inherent benefits of CC for small to medium sized enterprises and how CC can be integrated into the business and also with other CC offerings and/or legacy systems that an organization may already be utilizing. Using Meri-Lapin Majakka Ry as study case, I carried out an analysis of the association to find out any potential savings and benefits they can accrue by moving some of their activities to the cloud. Integration of Cloud-based services with the electronic financial management system they intend to use and if this can also be provided for from the cloud. Additionally, considerations when moving data to the Cloud and also the IT industry standards to consider when integrating between Cloud-based service offerings were also discuss.

As businesses search for ways to meet their ever-increasing IT demands, many are closely examining CC as a real option for their needs (ISACA 2009). The questions that businesses ask from themselves may be several, including if they really know what CC is and how it can be beneficial to both businesses and end users and if CC is just a fad or is something that will revolutionize computing as it is known.

CC seems to be an interesting topic and Majakka wanted to find out more about it. According to Hietala (2010) Majakka's ICT coordinator, they are such a small organization with limited financial resources that it is doubtful whether the association can fully adapt CC. Due to the current economic situation, the association were looking at ways of cutting down on operational costs by moving more towards Open Source products (Hietala 2010).

1.2 Structure of the Study

This study is divided into eight chapters. Chapter 2 presents the individual research contributions and the methodological underpinnings are also discussed. First the chapter discusses the research questions. Then the chosen research methods and the motivation for these are discussed. Chapter 3 is a review of CC; the drivers to CC, CC service and deployment methods and the concerns in CC. Chapter 4 considers the architectural framework of CC and looks at CC standards and the related ongoing work. In Chapter 5, an overview of the association including the associations' future plans, and the

requirements are also discussed. Chapter 6 looks at the benefits of CC to business and what users should consider before selecting their CC providers. Chapter 7 identifies SaaS-based CC solutions, taking into account all the relevant features and considerations for adoption of these. Finally, Chapter 8 entails analysis of the findings and proposed use of the SaaS-based platforms for Majakka, avenues for further research, limitations of the research and the chapter closes with the conclusion.

2 RESEARCH TOPIC, QUESTIONS AND METHODOLOGY

This chapter presents the individual research contributions and the methodological underpinnings. First the chapter discusses the research questions. Then the chosen research methods and the motivation for the choices are discussed. Finally, the data collection methods to supplement the work will be discussed and also an explanation of how the empirical work was carried out.

2.1 Research Topic and Questions

Good research is made useful by effectively communicating its purposes, methodology, results and implications. The purpose of research is to answer specific research questions and thereby enable better decision making. Methodology is a detailed account of the research design and the way the project is implemented. The results and implications summarize the major findings and conclusions as they relate to the study's objectives (Hair & Money & Samouel & Page 2007, 398).

As the cloud changes the way computing resources are utilized, it requires governance initiatives and involvement of a broad set of stakeholders (ISACA 2009). The purpose of this research work is to create a framework for Meri-Lapin Majakka Ry that will provide a means for them to integrate cloud computing into their business and look at how various CC solutions can be integrated and the concerns related to this integration if any. The process for creating the framework involves the following activities:

- Discussion on the integration solutions for various distributed applications in the cloud.

- Identification of the current business methods and the deficiencies (if any) that exist. This identification will be accomplished by interviewing the staff mainly the information and communications technology (henceforth ICT) coordinator.

- Documentation of the current business needs and growth plans.

- Comparison of the cost of utilizing CC vis a vis their current expenditure and whether there are potential and significant cost savings.

The processes above will help to expound on and find answers to the research questions

discussed below:

RQ 1 Why is integration a key issue to consider in cloud computing?

No single discipline is as effective individually as it is when integrated with complementary disciplines. This is one of the cornerstones of systems management: the integration of separate but related products and processes (Schiesser 2002, 4). Finding answers to this question entails analysis of the standards and integration options between on-premise and CC solutions and also between different services provided in the cloud and what effect this has on businesses. CC being a new concept, the standards may not be clear and with different and competing CC offerings from vendors, smooth integration with competing vendor services may not be a priority. This makes the standardization process all the more important.

After looking at the standards, there is also the issue of security which is still a key factor in CC and this leads us to the second research question.

RQ 2 How is the security issue dealt with in the CC environment?

ISACA (2009) states that CC may help enterprises realize increased levels of automation and efficiency amongst other benefits although professionals in IT are citing increased risk levels with storing of information to the Cloud as an issue to be considered.

The fundamental issue to consider when choosing to move data to the cloud is the issue of trust. How sure can one be that their information is safe (Hietala, 2010)? To answer this question, various documentation and webcasts from security professionals are investigated and stated for discussion. Additionally, companies various security policies will be analyzed.

RQ 3 What impact will CC have to Meri-Lapin Majakka Ry and their business methods if they adopt it?

This involves analysis of the various CC models whilst laying more emphasis on those that can be utilized by small and medium sized enterprises (henceforth SME).

Comparison of CC offerings from various organizations is also undertaken to find out which provides the best fit for the association. For all the advantages it brings to large companies, the advent of virtualization, CC and the related concept of software as a service arguably brings more benefit to the small and medium enterprise "How cloud computing plays into the SME's corner". This research work dealt with finding out whether and how these benefits can be utilized by the association.

2.2 Research Methodology

Research work and comparable development work refer to systematic activity to increase the level of knowledge and the use of the knowledge to find new applications. The essential criterion is whether the activity generates fundamental new knowledge. The research method used in this work will be combination of exploratory and descriptive research methods. Hair et al. (2008, 157) report that descriptive research is designed to obtain data that describes the characteristics of the topic of interest in the research and provides a detailed picture of the study topic. The primary objective of descriptive research method is to make use of the results to facilitate predictions or control of some behaviors. "The research helps to describe, explain, and validate findings". Description emerges following exploration, and organizes the findings so as to fit the explanations, and then validate those explanations. (AECT, 2001.)

Exploratory research is used to develop to improve understanding of a business problem and it incorporates the development of concept, theory and assumption. Exploratory research is utilized as it helps to gain a better understanding of CC and to discover new relationships, patterns, and themes that can be implemented by Meri-Lapin Majakka Ry (Hair et al. 2007, 157). In using these two research methods, the study attempts to provide an opportunity to develop a new and practical framework for Meri-Lapin Majakka Ry that could provide a possible means for them to improve the business process and lead to improved efficiency by embracing CC.

2.3 Data Collection Methods

To collect and to analyze information is very essential to evaluation of requirements. Exploratory research relies heavily on qualitative techniques (Hair et al. 2007, 154). Qualitative studies tend to produce large amounts of data that are not readily amenable to mechanical manipulation, analysis and data reduction. Therefore, the basic goal of qualitative data analysis is to aid in understanding the research topic. That is, the search of coherence and order and it involves mostly the recording of narrative information (Jarvinen 2004, 75) which can later be used in the implementation process.

Both primary and secondary information sources were utilized for collection of data in this research. The main primary source of data that supplemented my work involved interviews mainly with the case organization's ICT staff, and E-mail interviews with knowledgeable individuals in the CC and ICT fields, including CC consultants, CC vendors support staff and staff from companies who are utilizing Cloud-based offerings. This was to get their views on CC and the impact it is having or will have in the IT field. The researcher mainly selected open-ended questions which provide a wider depth of knowledge and allowed the interviewees to express their opinions on their use or involvement with CC-related products.

Secondary sources consist of wide review and analysis of relevant documented information. The exploratory nature of the research work also implies that the researcher is more inclined to rely on literature review. These include but are not limited to handbooks, journals, articles, the Internet and listening and participating in online webinars which helped to gain theoretical and practical relevance of the study. The literature to be reviewed includes information on service-oriented architecture (henceforth SOA) which is an architectural model based upon independent services, with well-defined interfaces designed in such a way as to promote reuse (Tipton & Krause, 2008); small and medium sized businesses and their operational models; examples of companies who have implemented CC and the deployment models utilized; data protection methods and the factors to consider before utilizing cloud-based services.

2.4 Expected Research Results

There are many factors to consider when deciding on whether to implement CC and if it has potential benefits; it can also be that not all business can benefit from it. With this work I intended to come up with a framework for Meri-Lapin Majakka Ry that will provide them with the option of moving to the cloud if it can improve their working methods and lead to improved efficiency. These benefits may however not lead to a reduction in their costs at least in the short-term. Since they already have an established method of conducting their business and it has served them well, my study was based on providing a different and more automated method of working by utilizing CC in their business processes which may take some time and effort before everyone is on the same level.
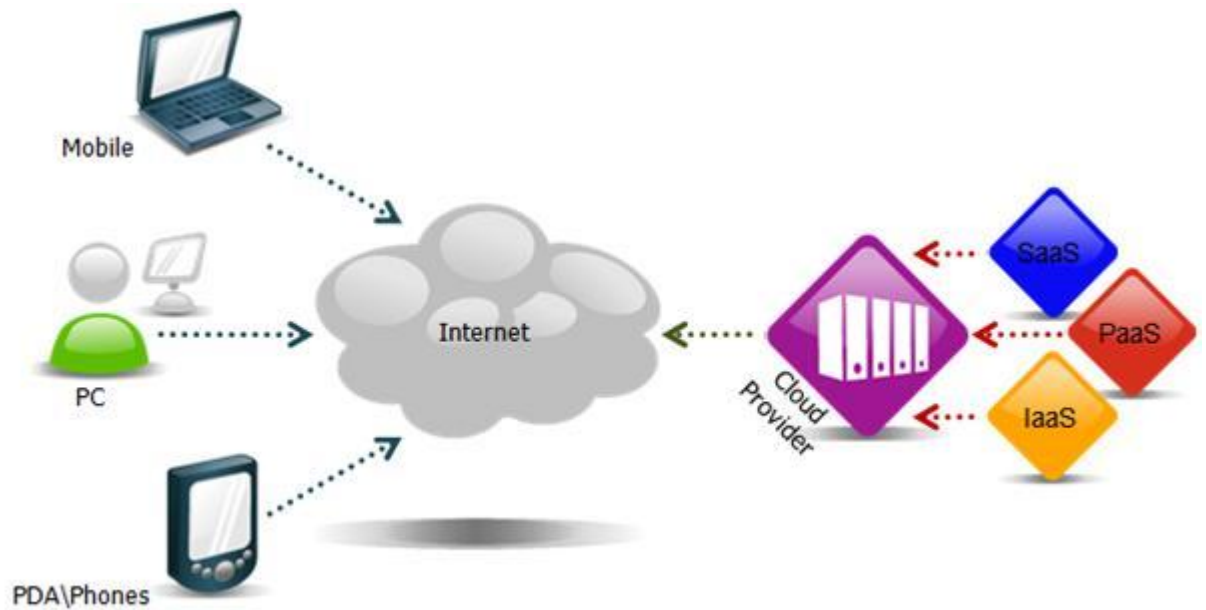
3 CLOUD COMPUTING

After looking at the association, this chapter focuses on CC. What CC is, its' characteristics, modes of deployment and the issues to consider before moving your services and data to the cloud. The chapter is a discussion on the common factors in CC and is meant to give a basic understanding of what CC is. To give a complete picture of the topic is beyond the scope and purpose of the study.

3.1 Introduction

Cloud platforms provide services that facilitate the creation of applications in competition with, or as an alternative to, on-premises platforms - the traditional platforms based on an operating system, a group of infrastructure services, and a set of packaged and customized applications. The crucial difference between the two platforms is that, while on-premises platforms are designed to support consumer-scale or enterprise-scale applications, cloud platforms can potentially support multiple users at a wider scale, namely at Internet scale. (Etro 2010.)

Use of CC does not entail building IT infrastructures, but instead renting storage, computing power or software services from other companies. "The services are accessed via the Internet, which in network diagrams is shown as a cloud, hence the name." (Hinchey 2011.) Hartig (2008) indicates that the concept is derived from the imagery of the ''Internet cloud'', in which the imagery of a cloud (Figure 1) is traditionally ''used to represent the Internet or some large networked environment''. We don't care much what's in the cloud or what goes on there except that we depend on reliably sending data to and receiving data from it.

Figure 1. Cloud Computing (UK Cloud Hosting, 2009)

3.2 Market Forces Driving Movement to the Cloud

As technology evolves we are finding that the methods for application delivery are also evolving, the most exciting being the movement of applications into the cloud. Kaplan states that there are a number of significant market forces driving the move to the cloud.

The first factor is the changing economic conditions. In spite of the fact that the relative size of IT cloud services may remain limited in the next few years, they are destined to increase and to have a relevant macroeconomic impact, especially in terms of creation of new SMEs and of employment. In times of global crisis, this could be an important contribution to promote the recovery and to foster growth. (Etro 2010.) A troubled economy requires companies to increase their efficiency and eliminate waste. As a result, activities that lead to new, innovative ways of working are often cut from the budget as there is tremendous pressure to conserve cash and limit new capital investments. (IBM - Staying aloft in tough times 2009.)

The second factor is the changing customer expectations. Globalization has led to more companies pursuing the same customers. At the same time, customers have become more sophisticated and informed buyers. Information technology has enabled them to find and analyze competing products and to make intelligent choices. Thus, customers

have discovered they have options and the power to exploit them. Customers now aggressively seek alternatives, compare offers, and hold out for the best option (Kotelnikov 2010).

The third factor is the changing competitive pressures. Dramatic changes in competition, technology, and workforce values are causing organizations to search for new and more human ways of increasing productivity and competitiveness. The biggest changes have been due to the impact of ICT. The ability to access vast information resources within a matter of minutes and to communicate across huge distances at ever lower costs and improving quality and convenience is transforming the way people and companies interact. Competition is now based more on capabilities than assets. New competitive dynamics led to greater instability in the profitability of companies. New products, services, and competitors are emerging with blinding speed. Competitive pressure has been intensifying and it is becoming harder to achieve market leadership and to stay on top. (Kotelnikov 2010.)

The fourth factor is the changing ecological concerns. Substantial positive externalities are expected because of energy savings: the improvement of energy efficiency may contribute to the reduction of total carbon emissions in a substantial way. ICT is responsible for 2 percent of carbon emissions in Europe, of which 1.75 percent is due to the use of ICT products and services, and 0.25 percent to their production (Etro 2010). CC employs a highly virtualized, shared dynamic infrastructure that will enable companies to evolve to a greener, more holistic approach to data center management via greater economies of scale, workload balancing and the integration of IT services with power and facilities management. (IBM - Staying aloft in tough times 2009.) People have increasingly become aware of the effects of computers on the environment, and this could be one of the key factors for driving the adoption of CC (Dwivedi & Mustafee 2010). For business leaders, contributing to the well-being of the societies and environments in which they operate has been shown to have a positive financial return.

CC infrastructures are generally deployed in very large data centers. Using cutting-edge technology it is possible to make enormous energy saving and reduce green house emissions. For example, Google-designed data centers use about half the energy of a typical data centre (Google 2010).

The fifth factor is the changing workplace requirements. Nowadays, there are some people who spend less of their time in the traditional four-roomed office and spend more and more time remotely or on the road and this leads to changes in the working methods. Also many organizations have branches across international borders and a shared cloud platform enables day-to-day collaboration among a company's employees, business partners and consumers (Kaplan 2010).

The sixth factor is changing technologies. Clouds can provide rapid access to computing capacity at a lower cost of ownership, enabling companies to perform operations that may have previously been unaffordable. This includes solving intricate scientific problems like understanding climate change and pinpointing key enzymes in the development of new drug therapies. For example, CC is enabling innovators to more affordably leverage the technologies required to understand the causes and speed the cures for brain-related illness. (IBM - Staying aloft in tough times 2009.)

Last, but not least, are the changing priorities and sourcing policies. Cloud-based service delivery changes the way companies interact with their customers, employees and business partners. It changes the dynamics of the supply chain and enables companies to profit from their core competencies in new ways, with new customers. With business leaders under mounting pressure to compress the time-to-market for new services, cloud's ability to marshal cost-effective, optimized computing resources in a matter of hours or days versus weeks and months is a real advantage. CC's loosely coupled services-based architecture enables companies to assemble desired services rapidly in mash-ups and composite applications based on specific work needs or market demands. Undertaking this independent of other systems improves the productiveness of the workforce and the speed of delivery to the market. (IBM - Staying aloft in tough times 2009.)

These market forces put together ensures that the CC era will be with us for the foreseeable future – driven not by technology fad or hype, but by real economic opportunity. Figure 2 below summarizes these market forces into the search for new market growth, the need for and emergence of new approaches and competitive pressures amongst CC-related companies.

Forces Driving Cloud Computing
- an IT Market View
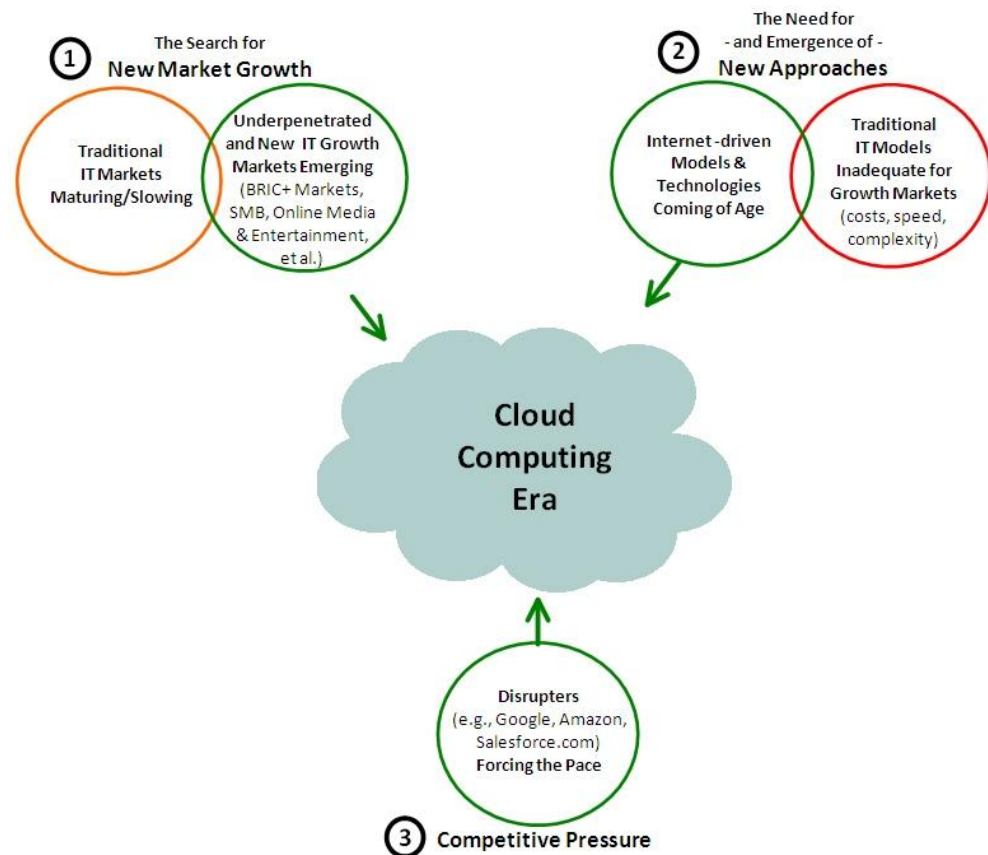
Figure 2. Forces Driving Cloud Computing (IDC 2008).

3.3 Cloud Computing Models

The cloud model can be thought of as being composed of three service models and four deployment models. Overall risks and benefits will differ per model and it is important to note that when considering different types of service (Table 1) and deployment (Table 2) models, enterprises should consider the risks that accompany them (ISACA 2009.)

The CC service model involves the provision, by a service provider, of large pools of high performance computing resources and high-capacity storage devices that are shared among end users as required. CC has several layers in which you can operate. The most used and widely implemented layers are: software, platform and infrastructure. These layers could run on top of each other, with software as the highest level and infrastructure at the bottom (Figure 3). The service models as stated by NIST

are first discussed.
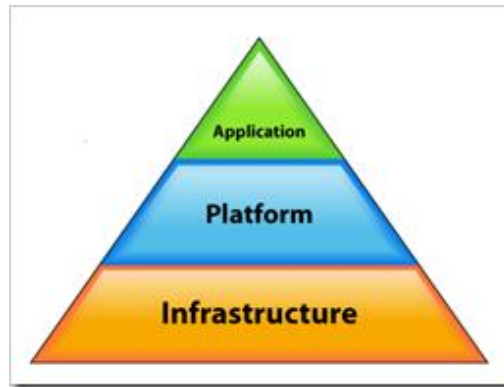
Figure 3. Cloud Pyramid (Sheehan, 2009)

Cloud Software as a Service (SaaS) - renting the full service. This refers to accessing vendors applications via thin client interfaces such as web browsers that are running on a cloud infrastructure. The consumer only has access to the application and has no control over it and is not concerned with the underlying infrastructure. SaaS eliminates worries about servers, storage, application development and related, common concerns of IT. Highest-profile examples are Salesforce.com, Google's Gmail and Apps, instant messaging from AOL, Yahoo and Google, and VoIP from Vonage and Skype (Fogarty 2009).

Cloud Platform as a Service (PaaS) on which software applications can run. PaaS generally abstracts the infrastructure and supports a set of application program interfaces (henceforth API) to cloud applications. PaaS facilitates the deployment and hosting of consumer created applications that use programming languages and tools supported by the provider. As with SaaS, the consumer has no control of the underlying infrastructure and control is limited to the applications created and deployed. Highest-profile examples include Microsoft's Azure Services Platform, Google App Engine and Salesforce's Force.com (Fogarty 2009).

Cloud Infrastructure as a Service (IaaS) - renting virtual machines. This is where consumers have access to computing resources that support operations such as storage, hardware, servers and networking components provided on a utility basis and owned by the service provider. As with the two service models discussed above, the consumer does not manage or control the underlying cloud infrastructure. Taking storage as an example, when a user uses the storage service of CC, they just pay for the consuming

part and do not have to buy any disks or even know anything about the location of the data they are dealing with. Sometimes IaaS is also referred to as Hardware-as-a-Service (HaaS). The highest-profile example is Amazon's Elastic Compute Cloud [EC2], GoGrid and Simple Storage Service, but IBM and other traditional IT vendors are also offering similar services (Fogarty 2009).

Table 1. Cloud Service Models Considerations (ISACA 2009).

Service Models	To Be Considered
Software as a Service (SaaS)	Options to minimize the impact if the cloud provider has a service interruption
Platform as a Service (PaaS)	- Availability - Confidentiality - Privacy and legal liability in the event of a security breach (as databases housing sensitive information will now be hosted offsite) - Data ownership - Concerns around e-discovery
Infrastructure as a Service (IaaS)	- Who owns the applications? - Where do the applications reside?

NIST further states that there are four deployment models which are also discussed below.

Firstly, there is the private cloud where the infrastructure is operated solely for an organization and may be managed by the organization or a third party and may exist either on or off premise. A private cloud is hosted within an enterprise, behind its firewall, and intended only to be used by that enterprise. Private clouds are scalable, efficient environments built around shared processing, storage, and networking pools. But they use on-premise infrastructure that companies can more easily control, and technologies like virtualization that most businesses already know how to use. Private clouds are also known as Internal clouds.

Secondly, there is the community cloud which is shared by several organizations and

supports a specific community with shared concerns such as compliance considerations, common mission, policy and so forth. It may also be managed by the organizations or a third party and may exist either on or off premise.

Thirdly, there is the public cloud which is available to the general public or a large industry group and is owned by an organization selling cloud services. So-called because it utilizes the public Internet to deliver software, platform, and infrastructure resources on-demand. Public clouds are also referred to as External clouds.

Last, but not least, is the hybrid cloud. This cloud infrastructure is a composition of two or more clouds (private, community, or public) and it refers to a situation in which an organization may store part of their data in-house and other resources are stored externally.

Table 2. Deployment Models Considerations (ISACA 2009).

Deployment Models	To Be Considered
Private cloud	• Cloud services with minimum risk • May not provide the scalability and agility of public cloud services
Community cloud	• Same as private cloud, plus: • Data may be stored with the data of competitors.
Public cloud	• Same as community cloud, plus: • Data may be stored in unknown locations and may not be easily retrievable.
Hybrid cloud	• Aggregate risk of merging different deployment models • Classification and labeling of data will be beneficial to the security manager to ensure that data are assigned to the correct cloud type.

3.4 Cloud Computing Security Concerns

The three main users of CC services are consumers, small organizations, and medium to large enterprises. Consumers and small organizations have relatively simpler requirements for adopting a new technology than medium to large enterprises and compared to the latter have much less to lose if the adoption goes does not go well (Kim 2009). Though, in a recent survey of small- to medium-sized businesses (SMBs) it was found that these organizations were the most unfamiliar with cloud-based security services, and were generally unwilling to move away from in-house systems (Condon 2010).

There are significant concerns about data security that need to be addressed when considering moving a business's applications and sensitive data to public and shared cloud environments. According to NIST (2009) most of the issues concerning CC can be summed up to consist of trust, multi-tenancy, encryption and compliance. Another main concern is the concept of e-discovery (Cunningham 2009).

Trust is one of the major factors that is blocking the adoption of CC. Data is the most important asset of many businesses – data about products, customers, employees, suppliers and more. To take advantage of the benefits of CC an organization must surrender a level of control over its own data, trusting the CC vendor to keep it safe and away from prying eyes (Chong & Carraro & Wolter 2006). Being used to handling their data in-house, many organizations find it difficult to give that bit of control to external entities.

Multi-tenancy is where a single instance of software runs on a Software as a Service basis on the vendor's servers, serving multiple client organizations (tenants). "In a multi-tenancy environment, multiple customers share the same application, running on the same operating system, on the same hardware, with the same data-storage mechanism". (SaaS Attack 2011.) Multi-tenancy is akin to living in a rented apartment versus living in one's own home; one housing company serves all the tenants, and one is no more special than any other tenant living in the same area. Everyone gets the same treatment and notices at the same time, for instance. The key concern here for potential users is security and how their data is kept and whether they are the only ones with access, since data for various companies (tenants) may reside for example in one database but in different schemas.

Concerning encryption, most if not all cloud security rests on being able to generate and hand out cryptographic keys, while keeping them safe and ensuring that they are accessed by the right individuals. The situation now is not anywhere near fully thought out and is just a set of agreed upon implementations and best practices. (Wolfe 2010.) The concerns here are the type of encryption being used, whether data is classified or not and how the data at rest and on transit is segregated and kept distinct. Also it is important to consider that an application with numerous customers will require individual trust relationships with each of the tenants.

Companies in highly regulated industries such as financial services and health care must comply with regulations such as Health Insurance Portability and Accountability Act (HIPAA) "Health Information Policy" and Financial Services Authority (FSA)
"Regulatory Reform". For these organizations, moving to the cloud may cause some contractual challenges with regard to how their data is kept and handled while in the cloud environment. Especially, since the data may contain personal and sensitive information about individuals and organizations business dealings. Companies are ultimately responsible for the security and integrity of their own data, even when it is held by a service provider in this case the CC vendor and if regulations must be enforced, the cloud provider must be able to prove their compliance.

Discovery is where the parties in a litigation dispute are required to provide each other relevant information and records, along with all other evidence related to the case including all electronic information such as word documents, spreadsheets, e-mail and audio and video. (AIIM 2011.) Currently with e-discovery, it is assumed that for the most part an enterprise knows the specific locality, back up methods and security of its' information. The rules also assume that an enterprise will be able to physically examine storage devices and, when required, examine storage media for evidence of erased and/or deleted files. (Cunningham 2009.)

Cunningham (2009) further states that in the Cloud environment, the enterprise has limited physical access and visibility to storage, backup processes and storage devices. Data of multiple customers stored in a single repository makes forensic inspection of the storage media and proper understanding of file access and deletion all the more significant. Also synchronization problems and techniques for segregating data in the log files are required.

For many organizations, securing their information is most critical, especially when that information is available over the Internet. These risks impact when and how organizations can take advantage of CC and each organization should plan and define their own path and timeframe for adopting CC. With regards to the security concerns, it is not always threats from external factors but malfunctions such as the recent incident where users of Google's Gmail account found that their accounts were accidentally wiped clean (BBC 2011). Though, according to Wenner Vogels Chief Technology Officer (CTO) and Vice President of Amazon, experience has showed them that security should be the number one priority and not just in CC, but in all areas where there is sensitive data to deal with and that is to be kept distinct. (Google Atmosphere Conference 2009).

4   ARCHITECTURAL FRAMEWORK

There is a widely held view that the cloud is not a new concept. Indeed, many of the technologies and services associated with CC, such as Web 2.0 or virtualization, have been in existence for some time. What is different in the cloud is that these technologies are being implemented in new ways to provide dynamic, scalable and virtualized computing infrastructure, platforms and software. (CPNI 2010.)

This chapter presents what differentiates CC from the traditional form of hosting, the developments in computing that have lead to CC, the relationship between SOA and CC, CC integration, integration considerations, and importance. The chapter closes with a look at related on-going work regarding the issues of cloud interoperability and standardization.

4.1 Distinguishing Features

The technologies prior to and those that CC utilizes have allowed customer organizations to achieve: improved utilization and efficiency of their service providers' infrastructure through the controlled sharing of computing resources with other customers; and, greater flexibility to scale up and down IT services. In some respects, CC represents the maturing of these technologies and is a marketing term to represent that maturity and the cloud services they provide. (CPNI 2010.)

According to NIST (2009) CC has five essentials characteristics: (1) On-demand self-service. This means that individuals can set themselves up without needing anyone's extra help (Spinola 2009), (2) Broad network access. That is, it is available through standard Internet-enabled devices such as laptops, mobile devices and so forth, (3) Resource pooling where processing and storage demands are balanced across a common infrastructure with no particular resource such as storage, memory and network bandwidth assigned to any individual user (Spinola 2009), (4) Rapid elasticity where capabilities can be rapidly and elastically provisioned, in some cases automatically, to quickly scale out and rapidly released to quickly scale in, and (5) Measured service more commonly referred to as pay per use where consumers are charged fees based on

their usage of a combination of computing power, bandwidth use and/or storage (Spinola 2009).

Multi-tenancy (which is also among the key CC concerns) is one if not the most important defining feature of CC and it is what enables both CC vendors and consumers to spend less and get more from a Cloud application. A multi-tenant architecture as previously discussed, basically means one instance of your product serving multiple companies and multiple users within each company. The more a Cloud provider's infrastructure and resources are shared the lower the costs for customers.

The challenge for selling software subscriptions, then, is to reduce operating costs in order to manage with less; otherwise the provider may end up doing much more than an on-premise vendor does, such as maintain multiple versions, run multiple infrastructures, maintain customer-specific code, and perform upgrades, but with fewer dollars. Multi-tenancy provides the answer, because it spreads the cost of the infrastructure and labor across the customer base; in fact, customers sharing resources right down to the database schema is ideal for scaling. (Misra 2010.)

The Clouds appeal implies scaling down as well as up when resources are no longer needed, no up-front costs, infinite capacity on demand and the ability to pay for use of computing resources on a short-term basis as needed. It is the new trend of computing where readily available computing resources are exposed as a service (Armbrust & Fox & Griffith & Joseph & Katz & Konwinski & Lee & Patterson & Rabkin & Stoica & Zaharia 2009). This differs (Table 3) from the traditional hosting model where an individual copy of the software runs in a single-server environment per customer.

CC applications are usually designed for a large customer base and all customers run the same instance of particular software and users can gain access to their applications from anywhere, at any time, through their connected devices. These applications reside in massively scalable data centers where compute resources can be dynamically provisioned and shared to achieve significant economies of scale (IBM - Seeding the Clouds 2009), whereas in traditional hosting environments durability, scalability and reliability are limited by the hardware. (WebDAM™ 2010.)

An example is discussed below to help in the distinction between CC's SaaS-based

service offering and regular hosting. It does not give the whole picture of what CC entails, but helps in clarification between the two.

A distinction between hosting and CC would be creating and deploying one's own blog or website. If one wanted to start a blog, they would visit the blogging providers' site and download everything needed to set-up a blog. Then the downloaded source code can be modified according to individual needs before uploading it to one's own server. In this case the owner is responsible for maintaining the website and has the ability to modify the code in any way they wish. Also, one has exclusive control over all of the data in the database. This approach entails more work, but also there is more control over the application and its hosting environment.

The other option would be visiting a blogging provider's or a web building site, creating an account and filling in all the details needed to get your account up and running. In this case, the site will host the website or blog for you. However, they retain control over all the information and one cannot modify the source code. The software belongs to the sites owner and you are only utilizing the service that the software provides. Although you lose some control over the application and your information, you gain a lot in terms of ease-of-use and convenience.

Table 3. Distinction between CC and Hosting

	Hosted Applications	**Cloud Applications**
Software License	Owned	Leased
Infrastructure	Hosted by customer	Hosted by vendor
	Maintained by Vendor Upgrades handled on a per-customer basis (Standalone updates)	Maintained by vendor Simultaneous upgrades to software regardless of number of users
	Depends on the actual hosting provider and mostly uses a single-server model with minimal redundancy and backup	Offers a higher level of redundancy and backup as data can be backed up in geographically distinct locations
	Limited IT resources and staff required	IT requirements and the staff provided mostly by the vendor
Financing	Capital expense (may depend on the size of the company)	Operational expense

CC differs from more traditional forms of computing in the way it scales computing and storage resources up and down. Instead of tapping from a fixed set of resources, users can add or remove capacity at will, almost instantaneously, and only pay for what they actually use. (ISACA 2009.)

4.2 Cloud Computing Enablers

CC arises from the need to provide computing resources as a service. The technologies driving the cloud movement today share similarities with architectures from days gone by and many of the technical concepts can be traced back several years.

CC combines a number of computing concepts and technologies starting from the use of a network of computers utilized together to gain large supercomputing resources which provides a level of scalability to those needing resources that may be too cost prohibitive to purchase. (Biswas 2011.) Secondly there is dynamic provisioning of IT resources to ensure that these resources are easily and continually reallocated in a way that addresses the organization's changing business and service needs. This involves renting of computing resources such as hardware, software and network bandwidth as required and on-demand. (Biswas 2011.)

The third factor is provisioning of user interaction and interconnection on the Web in the form of forums, wikis, blogs and so forth. Additionally, the growth in use of open source technologies has opened the field in terms of cost barrier to entry and providing Cloud access to Open Source Software (OSS) could therefore reduce the cost pertaining to, for example, SaaS application development (Dwivedi & Mustafee 2010).

The fourth factor is the addition of new features and components into an application without creating them from scratch. Finally there is the introduction of a layer between the hardware and operating system where multiple applications run on one computer which helps to improve on server utilization.

These developments in computing can be referred to as Grid Computing, Utility Computing, Web 2.0, Free and Open Source Software, SOA and Virtualization respectively (Mell & Grance 2009). There is a current shift in IT that is affecting not only business models, but also the underlying architecture of how applications are developed, deployed, run and delivered. Developments in networking technologies have enabled the advances in information and e-commerce services experienced today. All these CC enabling factors have all been possible due to the continued developments in broadband networks which are the connectors to the cloud and improvements in network access are a primary requirement for increasing the uptake of CC as a concept. (CPNI 2010.)

Added to the developments discussed above are service level agreements (SLAs) between the company and the consumer (Mell & Grance 2009). As CC essentially involves consumption of services, the quality and reliability of these services become

important aspects to consider. However, the demands of the service consumers vary significantly and fulfilling consumer expectations from the service provider perspective requires a negotiation process. At the end of this process both the provider and consumer commit to an agreement referred to as the SLA. This SLA serves as the basis for the expected level of service between the consumer and the provider. SLA contracts record the level of service, specified by several attributes such as availability, serviceability, performance, operation, billing or even penalties in the case of violation of the SLA (Keller & Ludwig 2003).

Although there are similarities in CC and the previously mentioned developments, what distinguishes them is the way applications that operate in a virtualized environment are designed, built, deployed and run, sharing resources and boasting the ability to dynamically grow, shrink and self-heal. (Perry 2008.) CC should be taken as the underlying platform that enables the availability of computing resources and not the services running on a specific platform.

4.3 How SOA Extends the Cloud Computing Scope

SOA is fundamentally an architectural pattern that helps to understand existing IT systems and organizations.

IT is built up of layers of IT systems (slabs) such as custom applications, client server applications, and modern systems such as Java App Servers where making changes can be slow and risky and logic isn't cleanly separated in layers for example. SOA helps with slabs by exposing the old, pre-existing functions trapped in these layers as business services. Additionally, SOA helps redundant and mutually inaccessible systems by creating interoperability agreements that reconcile how systems talk to each other, the data formats they use, and the organizational barriers to cooperation. (Matsumura & Brauel & Shah 2009, 20-22.)

According to Rosen & Lublinsky & Smith & Balcer (2008, 5), SOA is not just about technology, but "an architectural approach to building systems that requires an investment in architecture and IT, a strategic and business vision, engineering discipline and governance, and a supporting organizational structure". It's about breaking

architecture down to a functional primitive, understanding the information and behaviors, and building it up again using service interfaces that are abstracted into a configuration layer to create and, more importantly, re-create business solutions. CC is something that can involve part of or all of the architecture. The core difference is that the system is extended to resources that you don't own or host locally (Linthicum 2009), but essentially both emphasize the service concept.

Rosen et al. (2008, 8-9), add that the most common motivations for adoption of SOA are strategic reuse of assets across multiple department's applications; need to provide more agile support to business processes, and to handle change management impacts more efficiently and effectively; Master Data Management; speed and ease of project deployment, concerns with duplication of work between projects; support external collaborators; efficiency in terms of time to market and development cost; bring together diverse lines of business across many geographies with faster speed to market; and finally, to integrate legacy systems.

Linthicum (2009, 7-8), further states that SOA is important to CC because its approach to architecture involves proper formation of information systems, it provides interfaces and architectures that can touch the cloud and it provides the needed architectural discipline with guiding principles to document and organize architecture. As organizations weave CC-delivered services into application many things break as the on-demand services change over time. CC can benefit from the already well established and fundamental governance practices in SOA Linthicum (2009, 16) continues. If an organization has followed an SOA based architecture then it becomes easier to move various aspects of the application to the cloud (Acharya 2009) as depicted in Figure 4 which shows a possible data synchronization scenario between services within a company and those services of the same company that are in the cloud.
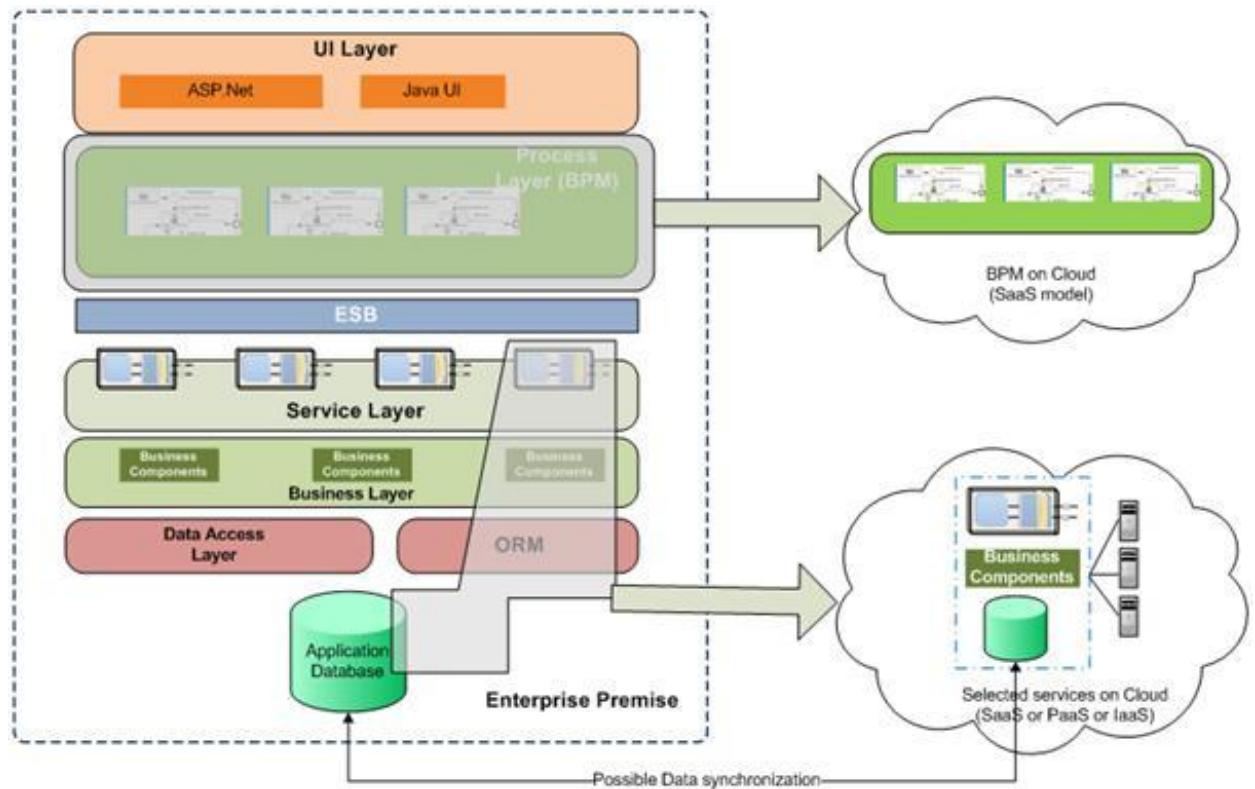
Figure 4. SOA + Cloud (Acharya 2009)

SOA is essentially designing services that are more flexible and less dependent on each other whereas CC loosens the coupling between the hardware and the software through, for example virtualization and multi-tenancy. The success for both these concepts depends on their respective services possessing certain desirable characteristics from a functional as well as from a Quality of Service perspective. And as a mature and already established architectural style, SOA brings in a wealth of mature processes, which are potentially applicable across the complete spectrum of everything as a service in cloud. (Devi 2011.)

Since SOA's focus is on business processes, it can get the needed focus from an organizations' IT team for example by enabling the push of infrastructure maintenance to the cloud. The complementary relationship between these two computing concepts can perhaps help in solving the integration concerns discussed in the next sections.

4.4 Cloud Computing Integration Concerns

According to Steve Cranford, managing director at PricewaterhouseCoopers, "company

executives considering ways to improve business operations, generate and find competitive advantage do not just want to hand over critical systems to cloud vendors simply to lower costs". Some executives want cloud vendors to consult with them about bigger goals, including integration and merging of existing systems. (Nash 2010.)

How a company manages their activities and the implications this has for the design of their information systems will depend on how information is shared across the company. Integrated data can be a platform on which the success of a company is built to; designing a sustainable architecture to ensure data flows across the organization in a standardized way is important for the smooth flow of information and technological processes across the organization. More collaborative working within and outside the organization can be enhanced by linking departments and implementing a set of integrated applications across the business spectrum.

CC is an approach to delivering IT services that promises to be agile and lower costs for consumers, especially up-front costs. The cloud approach impacts not only the way computing is used but also the technology and processes that are used to construct and manage IT within enterprises, for service providers and consumers. (DMTF 2009.) Integration of services within an organization may be clearer and straight forward due to familiarity of internal business processes and organizational requirements albeit with minimal difficulties, but it becomes a concern when considering moving a function of the business process out to the cloud.

Any company that runs business applications needs to exchange data between applications. Even small companies may still have more than one application (for instance, a payroll application, sales/marketing database, inventory/production application) in its environment. If the company decides to move one function out to the cloud, say the sales management function to SalesForce, then the success of that "outsourcing" will depend on how well the SalesForc data integrates back into the company's internal production systems. (Rao 2010.)

According to DMTF, to add to the factor of integrating in house solutions with CC services are the concerns of integrating computer, network, and storage services from one or more Cloud service providers into the business and IT processes; managing security and business continuity risk across several cloud providers; managing the lifecycle of a service in a distributed multiple provider environment in order to satisfy

SLAs with customers; maintaining effective governance and audit processes across integrated datacenters and Cloud providers; and finally how to adopt or switch to new cloud providers. (DMTF 2009.)

The growth of CC has led to the use of a more diverse set of applications both in small and large organizations and this leads to more dispersion of applications with continued movement to the cloud thus, increasing the need for integration.

4.5 Integration Considerations and Proposals

Data integration comprises the techniques for achieving consistent access to and delivery of, data across the enterprise, to meet the data consumption requirements of all applications and business processes. As such, data integration capabilities are at the heart of the information-centric infrastructure and will power the frictionless sharing of data across all organizational and system boundaries. (Friedman & Beyer & Thoo 2010.) The aforementioned market forces driving movement to the cloud are forcing organizations to manage their data assets differently.

Cloud application integration is complex, but vital to ensure that cloud benefits are realized. According to Dan Greller, co- CIO (Chief Information Officer) at Legg Mason, "going to a more distributed form of computing always brings up concerns about performance, and cloud is extreme distributed computing". (Nash 2010.) Bad integration can degrade overall application performance and the key to cloud integration success is settling on a design for your integration scheme according to Matt Hahn CIO at PDS Tech (Nash 2010) and analysing the needs within the organization so as to find a best fit that will enable continuous flow of information both internally within the organization and externally to the cloud.

The features and usability of, for example, a SaaS application have to be evaluated in the same way as one would evaluate any other application. Then one needs to consider how well the application's data and processes can be integrated with the applications already running in your data centre or with other cloud-based applications. "With application integration, you first need to get the data integration right, so data about customers, products, and so on can be shared, synchronized, and reconciled. Then you

need to worry about process integration - when a payment clears in one app, for example, a pick-and-pack order kicks off in another". (Knorr 2010.) Friedman et al. (2010), further state that synchronization of data between operational applications and across enterprise boundaries (between trading partners or between on-premises and cloud-based applications) also represent areas of growth.

To deliver full range of data integration scenarios factors such as the ability to relate with a range of data structure types such as XML, legacy and non-relational databases and the ability to provide data to consuming applications, processes and databases in a variety of modes should be considered. Additionally, built-in capabilities for achieving data transformation operations of varying complexity such as lookup and replace operations; metadata management and data modelling capabilities such as automated discovery should be taken into account. Moreover, facilities for enabling the specification and construction of data integration processes, mechanisms to help the understanding and assurance of data quality over time, and exhibition of service-oriented characteristics and provision of support for SOA deployments such as interaction with service repositories and registries should also be considered. (Friedman et al. 2010.)

According to Friedman et al. (2010) recent years have seen an increase of companies providing integration related services and this growth is expected to continue. Organizations such as Informatica and Pervasive have paid more emphasis on simple cloud-based offerings which address common integration tasks for organizations with limited resources. Midsize enterprises and business analysts outside of IT in larger organizations are also now looking at the integration possibilities provided, especially in public and private Cloud-based infrastructure as a way to provision development, testing, and quality assurance which are essentially non-production environments. Likewise, providers of SaaS-based applications are also looking toward simple cloud-based data integration services as a way to ease the challenge of on-boarding new customers. (Friedman et al. 2010.)

However, Clouds APIs are not yet standardized, and each Cloud provider has its own specific API for deploying and managing its services. For example, Amazon EC2 API, "Amazon Elastic Compute Cloud" is different from GoGrid "GoGrid Cloud Hosting", even if both offer similar services regarding IaaS. In addition, each cloud provider has

its own solution that tends to lock users into a specific technology and/or complicate integration. (Machado & Hausheer & Stiller 2009.) Though there have been some efforts towards solving the integration concerns especially in the SaaS category with big vendors (Figure 5), such as Salesforce and NetSuite, which sell e-commerce and customer relationship management (henceforth CRM) software, offering good integration tools for popular business applications. But the tools to interact with older or niche providers, much less to systems that have been developed in-house are missing. (Nash 2010.)
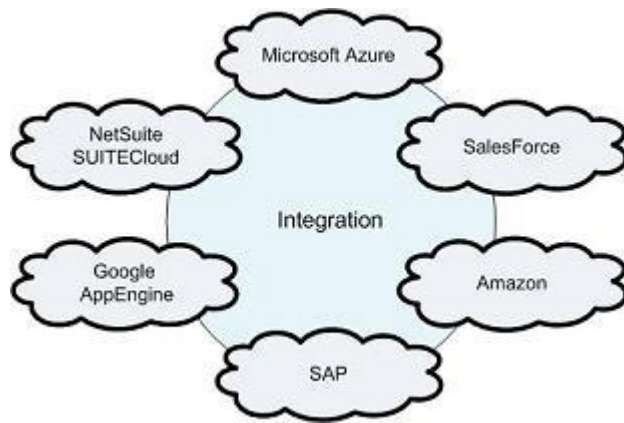
Figure 5. Cloud Computing Vendors (SaaS Attack™ 2011)

Organizations should ask their cloud vendors to provide clear documentation on the data formats and schemas used to store information in their systems (EMC 2010). In a cloud environment, integration of services should be among the most important considerations and focusing on activities that add value to the business as opposed to simply managing infrastructure helps a business to maintain consistency and focus on its mission critical goals.

4.6 Cloud Computing Standards

The Cloud is still very much a new development and in some situations, in order to utilize the benefits in an efficient and effective manner, customers may opt to use different Cloud types at the same time in order to meet different business needs. Customers may also change Cloud providers because of a change in the business process, undertaking of a new venture or simply because of differences with the vendor

leading to a revision of the decisions regarding CC use, expenditure, and the potential savings and earnings.

In the case where customers have to utilize different Cloud environments, then they may need to manage all these different clouds using different APIs, and any change in the Cloud environment may lead to having to change parts of one's application or code. The need for well-defined standards thus plays an important role towards interoperability and manageability between clouds. (Machado et al. 2009.) Added to this are concerns with the legal framework, with regards to ownership of data if a consumer fails to pay the monthly or annual fees, depending on the payment scheme and issues of privacy and confidentiality, location of data, unauthorized use of data and service-level agreements (Harding 2010).

According to Datamonitor's Trifković, "the Cloud is still very much a new frontier with very little in the way of specific standards for security or data privacy". As is frequently the case with disruptive technologies, the law lags behind the technology development for CC Binning (2009) adds.

The CC world is an area with great expectations but little commanding consensus of architecture thus far. "CC is normally associated with open source standards, but the different major cloud approaches are not compatible with one another, so possible 'lock-in' on the cloud is still a concern". This is one of the many challenging implementation issues that make Cloud development something of a frontier territory Vaughan (2010) states. With CC there are three attributes of apparent concern. "These include 'API lock-in' (a similar concept to vendor lock-in), migration issues, and the richness or functionality of an API" (Denman 2010).

There are some initiatives in the area of standards for CC, but none is focused on building standards with an explicit separation between core and proprietary functions in mind. (Machado et al. 2009.) Standards groups such as the Distributed Management Task Force (DMTF), the Cloud Security Alliance and the Open Cloud Consortium are developing standards for interoperable management, data migration, security and other functions, but real standards at the quality levels corporate IT requires are still a couple of years away. (Fogarty 2009.) Among the on-going standards related work includes the following:

1. DMTF's Open Cloud Standards Incubator (OCSI) focuses on standardizing interactions between cloud environments by developing cloud resource management protocols, packaging for interoperability "Cloud Management".

2. The Open Cloud Computing Interface Working Group (OCCI-WG) was originally initiated to develop mainly a practical specification related to IaaS. It focused on a solution that covered the provisioning, monitoring, and definition of cloud infrastructure services. It has since evolved into a flexible API with a strong focus on integration, portability, interoperability and innovation while still offering a high degree of extensibility. The current release of the Open Cloud Computing Interface is suitable to serve many other models in addition to IaaS, including e.g. PaaS and SaaS "An Open Community Leading Cloud Standards".

3. Cloud Data Management Interface (CDMI) specifies a functional manner on how applications create, retrieve, update, and delete data elements from the cloud. As part of this interface the client will be able to discover the capabilities of the cloud storage offering and use this interface to manage containers and the data that is placed in them. In addition, metadata can be set on containers and their contained data elements through this interface "Cloud Data Management Interface".

"As standards are somewhat restrictive and CC still remains at such an embryonic stage, the imposition of strict standards could do more harm than good", says Trifković. There is also slight reluctance on the part of Cloud providers to create standards before the market landscape is fully formed. (Binning 2009.)

While these standards are being developed, enterprises will find it harder to adopt the Cloud than it should be and mistakes will be made. It is tempting to call for instant solutions, but history shows that effective standards can only be created based on experience. (Harding 2010.) However, the benefits of a common standard are likely to emerge over time, enabling both small and large organizations to adopt a top-down approach in the adoption of Cloud-based services.

5 MAJAKKA – CENTER FOR CIVIC ACTIVITY

To understand which functions are the most beneficial to a company at any point in time is critical to acquiring management support. One aspect sometimes overlooked is that an organization's dependency on a specific system's management discipline may change to reflect a company's goals. (Schiesser 2002, 47.)

This chapter presents an overview of the association and its context, the choice of the association, what it does, the current projects and future plans. Also the requirements for the association are presented.

5.1 Introduction

Meri-Lapin Majakka Ry (registered association) is a non-profit association funded by Raha-automaattiyhdistys (RAY), Finland´s Slot Machine Association. The association has been in operation for close to eleven years and funding from the Slot Machine Association commenced three years after the association was formed in the year 2004. RAY provides the largest share of financing for civic organizations in Finland such as Majakka and this prohibits such organizations from taking part in public bidding as a provider of services since they are publicly funded.

There are two types of funding that associations can apply for: A General Grant (Yleisavustus, Ay) and a Directed Grant (Kohdennettu toiminta-avustus, Ak). General Grant is meant for supporting the operations of big nationally active associations and Directed Grant is meant for a certain specified purpose. An association can apply for only one General Grant but they are able to apply for several Directed Grants. In Majakka's case, they have a basic operational funding, a Directed Grant, for their day-to-day everyday operations.

Majakka is a co-operation association that was founded by other local associations in the Kemi-Tornio sub-region as a co-trustee body. Majakka is therefore an association of associations with representatives from the regional associations in Majakka´s board. Majakka´s goals are to promote and develop the general welfare in the area; increase

participation of the inhabitants in local affairs so as to increase their sense of belonging and togetherness; to strengthen the functioning of the local associations; and to improve their ability to do their work and also enable them to efficiently serve the community.

5.2 Majakka's Role

Majakka promotes co-operation between different interest groups: associations, communities, schools and so forth by gathering and providing information concerning local associations. Association Web (Yhdistysnetti) contains information on all social and health associations of Kemi-Tornio sub-region. Association Web contains general information about each association and their contact details making it easier to find information about the regional associations operating in the Kemi-Tornio area and thus enabling co-operation.

Majakka strengthens associations' possibilities to operate by supporting their basic operations. The main goal is to support and strengthen the local associations' ability to provide their services and to help meet people's needs. Some of the services Majakka offers include, but are not limited to:

- Rental of meeting rooms
- Mailing services, copying, lamination and document disposal services
- Catering
- Strengthening of member associations' information, marketing skills and electronic services.
- Designing of brochures, logos and newsletters
- Public Internet Access Point
- Offering IT Support Services
- Developing websites and also providing web space in their portal for the member associations
- Monitoring associations' interests in communal decision making, offering general advice, guidance and support.

5.3 On-going and Future Projects

Majakka's operations are divided into ICT, an information and service team and then there certain members responsible for the coordination of the Resurssi- ja Tukikeskus-hanke project discussed below.

Resurssi- ja Tukikeskus-hanke (RETU), formerly Jatke-Hanke project, is a project to promote and support local voluntary work done by associations. Normally the work starts with a survey of the voluntary work done by associations in the region in order to gather reliable information. Then the project develops further and moves on to supporting and finding ways to connect people in need of voluntary work and those who would be willing to do voluntary work.

Virtuaalijärjestö@hanke (started in 2010), formerly Virtuaalimajakka-Hanke project, is a continuation of a previous project Tietotekniikalla yhteistyöhön (Co-operation with ICT) that Majakka previously had from years 2007 to 2009. The project promoted ICT-solutions for associations in Kemi-Tornio sub-region and also led to the creation of Majakka´s portal which also included sites for Majakka´s member associations. The project now expands Majakka´s operating area to the whole of Lapland. Lapland has six different sub-regions including Kemi-Tornio. Others are Tornionlaakso, Rovanseutu, Tunturi-Lappi, Pohjois-Lappi ja Itä-Lappi. All or most of the required information for social and health associations within the Lapland region will be accessible from Lapland´s Association Web (www.lapinyhdistysnetti.fi).

Henkilökohtainen apu (henceforth HAPU) - Personal assistant rights for the disabled was legislated in the beginning of 2009. This ensured that the disabled had a legal right to their own personal assistant. Therefore, HAPU was launched to cater for these needs and the project will also involve handling of payments for those with personal assistants. Later on in the future, the project may be expanded and Majakka may start to offer electronic financial management services to all or most of the associations in the Lapland region.

5.4 Requirements Analysis

The world is changing. Customers and the workforce are demanding more and better service, delivered through every possible imaginable medium. The workforce needs to be abreast with the changing working needs and the diverse requirements from clients. Clients on the other hand, require that they be served as and when needed without thought of how the product and/or service is delivered to them. With this in mind organizations need to be more automated and conversant with Web 2.0 technologies that allow for more user interaction and interconnectivity both internally in terms of their working methods and externally with regards to how they deal with prospective service consumers.

From interviews held with the association's ICT coordinator and other members of the team, it was determined that the association needed to improve on and required the factors discussed below:

- Majakka.fi is an interactive Web site where people and organizations can get information on associations activities in the region and member associations can exchange resources and ideas or locate opportunities and followers

- The association lacks a centralized way to keep track of general inquiries and also inquiries from the Web site and as a publicly funded and non-profit registered association, Majakka requires an inexpensive and cost-effective solution that would not require extensive investments of time and money to set up and maintain and at the same time, find something they could customize to match their requirements

- Majakka needs to improve and replace the use of Spreadsheets and universal storage mediums (USBs) it is currently using to store and manage its objectives. This makes it difficult to get a comprehensive view of operations and track project and growth outcomes. Hence the need for a system to manage its mission critical data.

- Majakka needs a solution to help create stronger relationships with existing and future clients, create targeted communications, build donor relationships (their major donor now is RAY and in the event that they stop or limit their funding, Majakka require avenues for other means of generating funds), and track potential donor activity and niche markets where they could focus on.

- With the HAPU project scheduled to start, Majakka will need a financial management system to handle payments and the chosen system should be

scalable to allow for growth as the number of clients will increase with time as Majakka expands its area of service.

The decision on whether or not the association can have some of her services provided for from the Cloud will be based on the analysis of the above listed requirements. As cost savings is also a consideration, CC will allow the association to concentrate on the core activities by providing a platform for them to lease critical technical and business solutions as a utility. For small organizations such as Majakka, CC can enable them to meet fill the unmet needs in a cost-effective manner.

In discussions with the ICT team, one of the issues considered was the possibility of the association one day becoming self sufficient. For this to happen, they would need to find a niche market where to serve commercially that can enable them to meet their operational costs whilst also being able to break-even. Being publicly funded also limits their capabilities in terms of trying out new services as they cannot compete with other enterprises in terms of price. But with privatization, the association can participate in public bidding of services and CC's ease of deployment, provides more room for diversification.

6 ON-DEMAND SERVICES FOR BUSINESS

On-demand services are services (software in this case) that are available when asked for over the Internet and this is becoming the common trend nowadays. It has become relatively easier for even smaller companies to access software that was previously inaccessible to them primarily due to budgetary constraints with the advent of CC.

This section looks at the advantages of CC to business and what businesses should consider before settling on a CC vendor.

6.1 Cloud Computing Value Proposition

According to Investopedia, a value proposition summarizes why a consumer should buy a product or use a service. The value proposition convinces a potential consumer that one particular product or service will add more value or better solve a problem than other similar offerings "Value Proposition". The growing competitive pressures and customer expectations aforementioned (Section 5.2) cause organizations to constantly weigh their value propositions in terms of the decisions that lead to the choosing of a set of products and/or services over others. CC enables the provisioning of computing and storage resources that provide an application platform as a service (Figure 6) which yields benefits for users as discussed below.

CC enables organizations to scale up or down IT services (application, platform or infrastructure) on demand; the pay-as-you-go approach for storage, processing and applications means more efficient use of IT spending; Cloud services are leased therefore there is little or no capital investment; there is little or no maintenance costs; and since many customers share the same infrastructure, the vendor is able to buy in bulk and amortize costs over more customers, potentially lowering per-unit cost to each customer. (Fogarty 2009.)

According to Kaplan (2010) organizations can utilize services with less computational resources and personnel needed within the company, which can also save on the total cost. Not being tied to hardware and software investment costs can lead to more room for development and greater diversification, especially for smaller organizations. Kaplan (2010) further states that quicker-time-to-value which is when an organization

derives sustainable value as the business changes, increased productivity, tighter customer vendor alignment, better management visibility and faster access to latest innovations are some of the added benefits.

Additionally, CC can dramatically accelerate the way companies create new products and services, in part through enabling product development professionals around the world to collaborate more effectively and access more powerful and economical computer resources. CC also increases the ability of organizations to mine their data for important trend information, such as customers' changing needs and competitors' moves in the marketplace. (Kaplan 2010.)

Moreover, CC levels the playing field between large and small companies by giving companies of all sizes access to information technology that previously was affordable for only the largest of companies. Finally, CC can help emerging economies leapfrog to higher levels of technological development by providing more immediate and affordable access to next generation applications, tools, and infrastructure. (Kaplan 2010.)

CC facilitates outsourcing of information management and IT operations, hence enabling workers to improve processes, increase productivity and innovation while the Cloud provider deals with the more technical details to ensure efficient provisioning of the service required. This requires significant changes to the business processes in order to take advantage of the opportunities that cloud services offer. (ISACA 2009.)
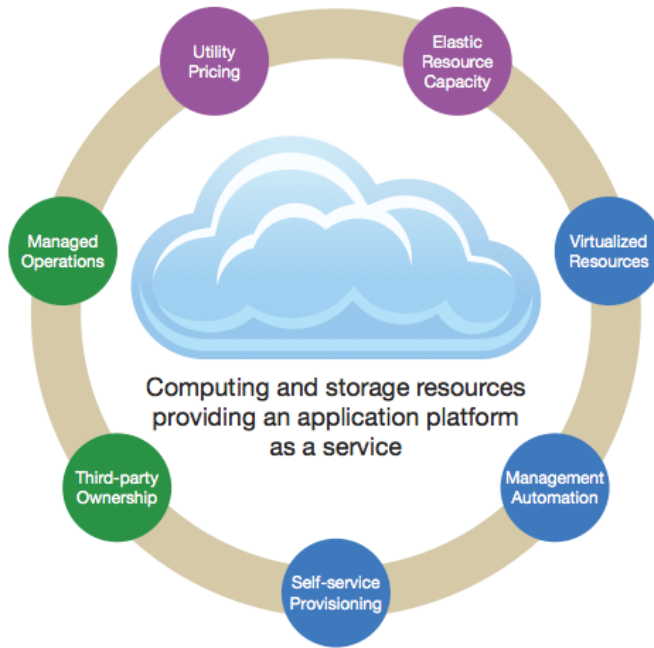
Figure 6. Cloud Computing Value (Ward-Dutton 2009)

6.2 Considerations Prior to Selection of CC Vendor

How an organization or any user of a particular service feels about a service provided to them can often be as important as what that service does for them. For this reason users who require a CC solution need to know and also ask as much information about the vendor they are getting the service from and how their data will be safeguarded. The starting point is a self analysis and determination from within the organization of the intended gains and then the Cloud according to Microsoft's Dave Coplin, should be thought of as an enabler to attaining the stated gains (Weber 2011).

Some of the issues to consider include the measure of security for the organization and the level required, the level of support and management required for the data and/or applications, the sensitivity of the data, regulatory concerns and so forth.

Successful transition to the Cloud may require a change in organizational processes, roles and responsibilities and also lead to a different working culture within the organization which may in itself be challenging. Rowan Trollope from Symantec states that the service providers' reputation should be checked and their track record in delivery of service, how security of data is enforced since the distributed nature of CC

enables security breaches to occur at multiple levels of technology, backing up of data and how it can be transferred to other providers, establishing good SLAs with both of the providers and consumers interests fully catered for and finally simply just give the service a try (Weber 2011). Most reputable CC companies provide a free trial period which may be used to evaluate the solution to find out whether and how it can be utilized within an organization and the functionalities it provides Weber (2011) adds.

Other concerns include the providers' business continuity plan so that consumers know what to do in the case of an emergency and how their operations can continue, consumers should have a right to know the jurisdictional requirements concerning the environment where the provider operates and consider the laws governing the interception and disclosure of their data for all jurisdictions in which their data is stored or transmitted across. (CPNI 2010.) Also whether the vendors' applications integrate with other software applications or with applications an organization may have in-house as earlier mentioned should also be considered.

Some of these considerations mainly apply to larger organizations due to the level and amount of data they handle and the technology needed to house these, but also smaller organizations with relatively simpler requirements should consider looking at some of these considerations as they will be handing the control of their data over to the CC vendor. Assessment of the risks in CC and also the vendors' management, growth and security policies should be carefully analyzed just as one would analyze any other aspect of the business and careful consideration should be taken prior to selection of a vendor as this may be a long-term business relationship with serious financial implications to an organization.

When the above mentioned considerations are dealt with prior to selection of a Cloud vendor, then users can truly be able to acquire the benefits and exploit the applications to maximum potential and hence improve on their perception on the service offered.

7 PROPOSED SAAS PLATFORMS

In this section a selection of SaaS based solutions are described taking into account all the relevant and important features of the CC solution.

Given the requirements by Meri-Lapin Majakka Ry, the researcher has mainly focused on SaaS-based platforms as these match with the aforementioned stated requirements of the association and in the researchers opinion, are best suited to meeting their objectives. SaaS-based products are mainly business applications such as document creation, spreadsheet and presentation, human resource (HR) and payroll applications, inventory management, accounting, invoicing and payment applications, project management applications, CRM software, helpdesk and much more provided on demand that can be leveraged to meet an organization's requirements.

7.1 Features Considered

According to Schiesser (2002, 93-100), the four key elements of delivering good customer service are the following: (1) identification of the key customers, (2) identification of the key services to key consumers, (3) identification of key processes that support key services, and (4) identification of key suppliers that support key services. Key suppliers are those who provide direct input in terms of products or support to the key processes.

There is a wide variety of cloud services available to business, and the decision as to which service is most appropriate must lie in the requirements of the company. Since most reputable vendors offer a free trial period for their applications, the solutions discussed below tested carefully analyze their features and determine how these could best be utilized by the association. Some of the factors taken into account included the following:

- User management – management of users and privileges given to them. Organizations may require someone to oversee the managing of services and who is also responsible for setting up accounts and determining user privileges.
- Response time (applies to the vendor) – how fast queries and request for further information are answered was also considered as this helps to determine the

level of customer support.

- Integration and Extensible APIs – whether a particular solution can be integrated with other vendors applications and if it is possible to integrate the API with existing systems and other third party applications.

- Jurisdiction – the researcher mainly considered international markets hence the jurisdiction concerns had to be addressed. Factors such as where the data is kept and whether the provider complies with European Union (EU) data protection laws were considered.

- Scaling - could the application infrastructure adapt easily to more users and what extra cost would there be for the addition of more users?

- Manageability – includes factors such as ease of use and of management and how the graphical user interface (GUI) is developed to enable efficient and more collaborative work.

The creation of economic value from technology is a critical managerial task in business. There is no single answer to how this can be done and the approaches taken must be specific to each situation. No company can have all the skills and technologies that are needed to satisfy any customer requirements. Each is dependent on the technology of others. (Ford & Gadde & Håkkansson & Snehota 2003.)

Three SaaS applications – a messaging and collaboration application, contact manager and financial management system and one IaaS application – a file sharing, synchronization and storage application were chosen for analysis by the researcher. These are only for illustration purposes to determine how they can be utilized within Majakka and the researcher does not offer comparisons between them and is also not advocating for the use of these applications over others available on the market.

7.2 Google Apps for Business

Google Apps offers simple, powerful communication and collaboration tools for enterprises of any size in business, education, government or non-profit all hosted by Google to streamline setup, minimize maintenance, and reduce IT costs. Google Apps comes in two versions, a standard and a premium one. The premium version comes with

more features for companies who need these and also an unlimited number of users. The free version has all the basic features required and is limited to a maximum of 50 users which is suitable for a small enterprise with no more than the number of users indicated. (Google Apps for Business 2011.)

Google-powered e-mail, instant messaging (IM), and calendaring can help users to stay connected and work together effectively. The essential collaboration tools Google Docs, Google Video, and Google Sites boost productivity and encourage innovation. Additionally, there are also administration tools, customer support, and access to APIs to integrate Google Apps with existing IT systems. (Google Apps for Business 2011.)

The security section of the Apps for business website states that Google Apps has multiple layers of protection to keep data safe and secure. Google operates one of the largest networks of distributed data centers in the world, and the company goes to great lengths to protect the data and intellectual property on these servers. Each piece of content can be as private or as public as necessary. Moreover, the addition of 2-step verification to users of Google Apps adds that extra layer of security. (Google Apps for Business – Security First 2011.)

Google Apps also promises a 99.9% uptime guarantee, offers customized email addresses (name@yourcompany.com) and phone support is available for critical issues. Google strives to make Google Apps as open as possible, with full accessibility and an ever-growing library of plug-ins. (Google Apps for Business 2011.)

7.3 Salesforce for Contact Management

Salesforce.com has been the front runner in the provision of SaaS-based CRM solutions and the company does not focus on a particular target market as it strives to serve all organization types and sizes. As with all other reputable vendors, free trial periods during which the application can be tested are offered after which one is required to upgrade to a paid monthly or annual plan. (Salesforce 2011.) Salesforce has a large AppExchange site that contains over a thousand Salesforce add-ons that can be integrated with other Salesforce applications one has signed up for. Though, some of

these add-ons may come at an extra cost to the user. (Appexchange™ 2011.)

Among the CRM solutions offered is the contact manager which is specifically targeted for small businesses and helps in the managing of business contacts. The contact manager promises ease of use, flexibility, customization, ironclad security, automatic upgrades, and fast connection. Furthermore, when you sign up for a free trial, there are both written and video tutorials to help with the adoption process. Online tutorials are by company staff can also be provided upon request albeit at a cost. (Salesforce 2011.)

The contact manager enables an organization to manage and track customer interactions, store unlimited contacts, record a copy of every email, integrates with Microsoft Outlook, Lotus Notes and Google Apps to sync contacts and calendars and the integration with Apps enables one to work with Gmail, for example, within Salesforce. The contact manager also enables more organization with tasks and reminders by adding to-do's list and scheduling of reminders and customization can be done with mouse clicks. Summarily, the contact manager offers the convenience of having all interactions and contact records managed from one central place. (Salesforce 2011.)

Salesforce have very stringent security controls in place and they have a website which explains their security and system reliability (Murphy 2010). Salesforce utilizes a multi-layered approach to protect key information, constantly monitoring and improving application, systems, and processes to meet the growing demands and challenges of security. The multi-layered approach is undertaken at various including secure transmission and sessions, network protection, disaster recovery, backups internal and third-party testing and assessments security monitoring. Trust salesforce com 2011.)

7.4 Zoho Books for Financial Management

Zoho.com offers several Productivity Apps, Collaboration Apps and Business Apps particularly suited for small business and individual consumers which include an Office Suite, CRM, Creator, Mail, Projects, and the recently launched Zoho Books among others. With Zohos, a simple web-based dashboard is used to administer the service.

(Zoho 2011.)

Zoho Books provides such features as creating, sending and tracking of invoices, creating of estimates for your prospects, maintaining a list of the products and services offered, tracking of all credit card expenses, refunds and payments, adding of bills received and recording of payments made. There is also the possibility to generate monthly financial reports related to sales, invoices, taxes and expenses (Zoho® Books 2011)

Data once entered is never deleted unless it is done by the customers themselves. Zoho servers are housed in most secure data centers and they use 256 bit SSL encryption, state of the art infrastructure and software security to ensure the safety of data. Data is also regularly backed up and replicated across multiple secure locations. (Zoho 2011)

7.5 Syncplicity for File Sharing, Storage and Synchronization

Syncplicity serves as web-based file hosting service where users can share, synchronize and store their files and folders with others across the Internet. Syncplicity offers both standard and commercial versions with commercial versions obviously coming with more features and storage capacity. Automatic file backup service is also provided when files are edited. There is a desktop application available for download which works in tandem with the online version. If one uploads a document or a file, for example, and makes changes to the local version the changes made will be replicated automatically without requiring any further action from the user. (Syncplicity 2011)

Since Syncplicity stores only one copy of a file or folder, if you delete documents that are locally stored or ones that are online on their servers, all copies will be lost. The folder that the Syncplicity application uses locally is always an exact copy of what is stored online.

Syncplicity enables transparent automatic synchronization of multiple folders and tight operating system integration as of this moment only Windows and Mac operating systems are supported. It also has a good web interface that allows access to deleted files and handles file versioning, which means that you can revert back to an earlier

version of a file if needed. The files are stored securely and password managed and only people that are allowed access can view them and once data leaves Syncplicity, it is securely protected using the same encryption methods banks and government institutions use. In their datacenter, each file is encrypted using military grade encryption before it is stored and the random key used in the process is then sent off to an entirely different location as an additional security precaution. (Syncplicity 2011)

The applications discussed above were chosen due to the fact that they seem to offer the features required and some offer services that are specifically suited to small enterprises and being able to analyze the features offered, leaves one in the best position to determine what can work and cannot work within an organization.

8 DISCUSSIONS AND CONCLUSION

This final chapter presents an analysis of the findings and offers proposals for adoption of CC for Majakka, limitations of the research are presented, the avenues for further research and the chapter closes with the conclusion

8.1 Introduction

For success as a company, it is critical to: (1) Leverage the success that is out there, (2) Understand that your loyal customers will help you build and adjust, (3) Do not over invest and (4) Take the time to decide where you want to be and do not try to be everywhere (Qualman 2009, 181).

CC permits users to acquire hardware or software functionality in small doses to test its capabilities and applicability to the user's needs. Therefore, IT or business decision makers have an opportunity to use CC in narrowly defined areas and then develop longer term plans to roll it out elsewhere in their organizations on a step-by-step basis. (Kaplan, 2011.) For example, a manager may add extra accounts for employees recently added to a team without having to worry about acquiring new servers or adding the capacity of the hard drive.

8.2 Analysis of Findings and Proposals for Adoption of CC for Majakka

To deliver good customer service, organizations need have a collaborative and automated system of working that enables quick flow of information both within and outside the organization. After weighing the pros and cons, the case organization may be ready to venture into cloud CC. Though, one of the problems of adopting a CC system is trying to take on too much. In the case of Majakka, they should start small and expand their use of the services incrementally.

For a small organization, keeping an organized office is essential to delivery and meeting of goals. Being able to collect, organize and analyze data uniformly across the organization using a robust and integrated workspace makes business management and

performance easier. For Majakka, the adoption of CC may help propel performance by better aligning her goals with the set organizational standards, thus increasing operational efficiency.

The four SaaS-based solutions discussed in the previous chapter may help towards meeting the said improvements if utilized within the association. Google Apps standard edition, for example, can help stretch the association's resources and enable her to work faster. As email is an important part of business, being able to set up a cloud based company account at no cost helps to greatly reduce on expenditure whilst providing the needed scalability. There is the possibility to configure shared calendars and collaborate on documents that are constantly changing which is a big part of service-based small organizations like Majakka. As the association is also involved in web development, Google Sites also included in the standard edition can provide for a more collaborative experience by affording the association the possibility to preview a mock up of their work to clients without the need for constant face-to-face meetings or having to send progress of their work as an attachment in an email. Since one can quickly create public and private Web sites easily with Google Sites, it allows one to share work with only a select number of people. Public means it is accessible to everyone who knows the web address and private means the web page is only available to the people the creator shares it with.

Most of the work undertaken by the association involves coordination of work and cooperation with other associations and local institutions. Therefore, there needs to be a standardized way to keep track of their contacts and establish strong links with them. The associations is also involved in soliciting volunteers for people involved in and in need of voluntary workers and maintaining contact with these is essential as it helps the association in meeting some of her objectives. Having a good contact base of volunteers ensures that the association has a constant supply of human labor in cases where extra workforce may be needed. Though suited for more commercially oriented organizations and is used to record information about customers and their views, the Salesforce contact manager can be implemented internally by the association to record emails, tasks and activities and externally it will provide for more efficient communication with partners and local institutions with whom they are in regular contact and also lead to more awareness of their opinions. The contact manager would provide an opportunity for the association to track activities, calls, emails and tasks in an integrated package. At

a cost of four Euros a month the contact manager is conveniently priced for a small organization providing the needed scalability as it can store an unlimited number of contacts. Furthermore, the contract can be run on a monthly or yearly basis. With the monthly contract the customer can cancel their account at the end of the month.

As the association is also venturing into provision of financial management services they can leverage Zoho Books to meet the needed requirements. Zoho.com develops products especially suited for SMEs and Zoho Books is extensible and allows effortless integration with their other solutions and they also promise a payroll addition to Zoho Books or as an addition to their portfolio after which the two can then be integrated. This addition allows for a more integrated and paperless financial management solution that can also be used commercially by the association. Zoho.com also deals with customers that are into varied business activities and they try to provide a work-around when a direct solution is not immediately available for an organization.

Finally, there is Syncplicity for file management, storage and synchronization which the association can use as a backup for their files and it allows for more automated collaboration as changes do not have to be made at multiple levels. As the storage capacity is limited to two gigabytes, organizations with more storage requirements may have to upgrade to the premium service. For small organizations that use this for file storage, it may take some time before the two gigabytes limit is filled up and with increased storage requirements, there is the possibility to upgrade to the premium edition which provides the required amount of scalability.

The Contact manager, Zoho Books and Syncplicity all have the advantage of being able to integrate with Google Docs and this can hasten the speed of service delivery for the association as there is a central repository for handling all of the association's documents. When adding information to the Website, the ICT team in the organization can locate the Service team's documents and or log in to the Contact manager to find the relevant information and check for further clarification when needed. For instance, all the above can be connected via their integration with Google Docs as once changes are made in Google Docs, files are automatically replicated and synchronized across all the three solutions. The three solutions are not themselves integrated with one another, but the possibility to integrate with Google Docs ensures that they are all connected.

In terms of user management, only Salesforce's contact manager and Zoho Books allow for designation of roles as these are premium solutions and have more strict administrative control. For Google Apps standard edition, there is limited administrative control and all users belong to the same organizational unit and have access to the same resources. Syncplicity has no administrative control for the standard edition which is limited two computers only, but as everything is cloud based, everyone with the right credentials can access the files and documents stored. For separation of roles, the head of the association could have an own folder for instance, while the other members share their own for more privileged access. Or in Google Docs, there can be a folder for the head of the organization which she as the administrator controls and only shares with a select number of individuals within the association.

Only the premium editions of the above solutions provide the needed customer support while the standard editions offer community enabled support which can be time consuming considering that one has try to solve a problem for themselves. Response times also vary according to the edition, but the researcher found that for premium editions response times are much faster. With Salesforce, for example, when one signs up for the trial version, one may get a call from their representatives to enquire about the needs and offer advice on the best way to utilize the product within an organization and email queries are also quickly responded to. Zoho Books is also similar with regards to email support and response to user queries.

The other advantage with Google Apps and Salesforce is that they both offer a Marketplace in the case of Google Apps premium edition and an AppExchange in the case of Salesforce that provide greater extensibility by being able to purchase and deploy additional integrated web applications and related professional services. In addition Zoho Books offers extension capabilities with other third party software, but when one would like to integrate with a product that is not among these add-ons then it would require major customization of their applications using programming languages which would not be possible or one would have to do this on their own if the provider allows.

The language the application is in should also be considered as both individuals and organizations are more inclined to use an application that they do not need translation of. For the Finnish market then it should be Finnish unless otherwise requested and for

most of the cloud-based applications one will also find that every national market has their own best of breed applications that are suitable for that market. Most CC vendors operating globally have solutions for different countries that are tailored to meet the specific regulations of the relevant market. Also it is important to consider the size of the cloud vendor as larger companies taking advantage of greater economy of scale have more experience and are likely to offer lower prices and more compact packages. Smaller companies have the benefit of providing more specialized services and negotiating the contract terms would also be much easier with smaller companies.

Enhanced collaboration and automation provided by CC applications could enable employees within Majakka to work how they would like to whilst also improving on their working methods. They can also perform their tasks more quickly with immediate access to the people and information required and by sharing knowledge with colleagues; new and innovative ways to address challenges can be found.

8.3 Limitations of the Research

The researcher acknowledges that this research work had its limitations which are discussed below.

This research partly relied on Email interviews to supplement the work, but the response rates to some queries were not as comprehensive as the researcher would have expected them to be. The few persons that responded needed further prodding which in some cases did not yield further responses and quite a number did not respond to queries at all. Out of a total of 19 email queries I received four responses and these were from support staff of two service providers covered in the research, one from an organization that has implemented the CRM solution from Salesforce and a knowledgeable individual with vast experience in the ICT field especially in SaaS service model of CC also covered in the research.

As the researcher had no prior interaction with the association, it was difficult get to a detailed picture of the working methods and a feel of the organizational culture. Without having a clear picture of the association's history, assumptions had to be made in some cases which made it difficult to project future outcomes.

The focus of the research was on CC which is a form of distributed computing. This implies that location of the vendor should not matter, though the reliance on mainly international information made part of the research to be general in nature. Without examples of local companies utilizing CC that could be used as a benchmark, the researcher had to mostly rely on international sources which do not take into account country specific dynamics.

A part of the research work involved sampling of various CC offerings to determine their features and how they can be used by the association. In trying to capture both quantitative and qualitative aspects of adopting CC by distinguishing between the situation prior to CC and the future, the researcher was limited by being unable to fully project future growth prospects for the association. Additionally, the researcher also experienced difficulties in determining the proper metrics to use in, for example, the financial management solution and the contact manager and had to rely on estimation and outdated information in the case of the financial management solution.

8.4 Avenues for Further Research

The largely exploratory nature of the research opens up avenues for further investigation. Though the researcher has looked at integration concerns and how various CC applications can be extended with the use of add-ons and/or integration with third party applications, there still remains the issue of proprietary solutions amongst different vendors which enhances the possibility for vendor lock-in. Further research could be done on how open standards and open source software could provide for a more open environment.

Also, further research could be undertaken on building of private clouds with the use of open source products and the opportunities and financial implications this may have for organizations and more specifically smaller and medium sized enterprises.

Lastly, the research briefly covered how the concept of SOA can be used to further extend CC capabilities. Further research can be done on how a hybrid cloud which is a combination of two different cloud environments can be further utilized and extended

by integrating them with the core tenets of a SOA. These are factors such coarse granularity which describes the size of the components that make up a system; Interface versus implementation that separates what a service does from how it does it; Contracts which define the obligations between the service provider and service consumer; and loose coupling which is a way of designing services that are more flexible and less dependent on each other. (Matsumura et al. 2009, 4.)

8.5 Concluding Note

CC has potential for transforming IT service delivery within organizations and with its low cost to entry; it significantly reduces spending on upfront costs and improves on overall responsiveness and adaptability. The purpose of this research work as mentioned in the first chapter was to create a framework for Meri-Lapin Majakka Ry that will provide a means for them to adopt CC and integrate it into their business. The results from interview with the association's ICT staff and from email interviews were collected and analyzed with use of literature review as guiding factor.

This research has greatly broadened my understanding of the concept of CC and its implications for business. The study has further widened my understanding of the drivers to CC and the underlying technologies that drive and enable the movement to the cloud. There is still plenty to learn as it such a broad field, but the work carried out in this research provides the needed platform for the researcher to carry out further and more constructive research work related to the field.

The research has covered integration concerns and current and on-going standards related work, CC security concerns, benefits of CC and finally how various CC solutions can be implemented within the association and the considerations. In this research process the researcher has managed to answer the research questions documented in the second chapter by providing a sample framework for adoption of CC by the association. It is also important to note that, there are several types of cloud services available to businesses, and the decision as to which service is most appropriate must lie in the specific requirements of the company.

Concerning the first question, the research has highlighted the integrations concerns, proposed solutions and avenues for further research as integration and standard related work is still an on-going process with no definite answers yet. Though as already mentioned there has been a rise of companies providing third-party integration connectors both for small and large enterprises and use of add-ons and third party applications to provide the needed extensibility of cloud vendors' applications.

Answering the second research question involved analysis of CC vendors and the security measures they have put in place. It also entailed analysis of documents from various security professionals and their views on secure data storage and the issues that need to be addressed before one stores or moves their data center to the cloud. The question of security is dealt with through enforcement of strict SLAs and review of vendor security policies which ensure that users know of the potential liabilities and what is expected from vendors in case of a security breach. Even though user data is in service provider's custody, this does not mean that the risk is also transferred so users themselves should also be vigilant.

Finally, the research looked at potential CC solutions (and their benefits and disadvantages) that could be utilized by the association and from the analysis; a scenario on how these solutions can be integrated together within the organization was suggested. The proposed applications were simply used to highlight how the distributed form of CC works and how it allows for a more collaborative and automated form of working. The applications as such were not the main issue, but the considerations prior to selection and the mode of utilization were the primary concerns. With the introduction of financial management services in the association which is a new service they intend to provide, there may not be cost savings initially, but with time as they expand their business scope and the scalability offered by CC solutions, volume discounts provided by vendors after continued use may be realized.

Through this research work, it has been determined that CC can be utilized across all organizations of all sizes and across any industry; CC can substantially reduce the operating costs of organizations and extend the value of their funds; and the size of a company, the scalability required, how data should be imported, compliance, encryption and ownership in case of breach in the SLA terms should all be considered. CC should be viewed as an out-tasking alternative to traditional wholesale outsourcing

arrangements. Instead of transferring an in-house function and the assets associated with it to a third-party to operate on behalf of the customer over a long-term period with strict restrictions, CC permits users to acquire access to additional resources on an incremental or extended basis more flexibly.

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INTERVIEW QUESTIONS

QUESTIONS FOR DETERMINING UTILIZATION, REQUIREMENTS, CONCERNS, PROBLEMS AND BENEFITS OF CLOUD COMPUTING THAT WERE USED TO SUPPLEMENT THE RESEARCH WORK.

Is cloud computing suitable for specific types of organizations or depending on needs, can any organization utilize cloud computing?

How should publicly-funded organizations approach cloud computing considering their reliance on these funds and the need to meet the donor's targets?

What are the key factors to consider especially for small and medium sized businesses when they are considering adoption of CC (or SaaS which has more business related offerings)? In terms of system scope how broad or narrow should the adoption be?

What are the issues to consider when considering integrating cloud services from different vendors (if a business would like to implement these) and how is service oriented architecture concept and clouding computing related?

Concerning the integration, what kind of support is offered to the company and what if a required solution is not part of the add-ons, would it still be possible to integrate in this case?

Regarding security, what do you foresee as the future of cloud computing in dealing with the security issues?

How is the issue of jurisdiction handled when dealing with data of companies based within the E.U. Are there any standard practices regarding jurisdiction and for instance liability in relation to loss of data?

INTERVIEW RESPONSES

RESPONSE FROM MATT MURPHY SALES AND MARKETING DIRECTOR
CHKS LTD UK.

We decided to adopt Salesforce because I had implemented the system in my previous role across 20 countries to over 200 users. The 'cloud' platform enabled us (in my previous role) to develop a central configuration and have remote users across the globe accessing the same information and adopting the same processes. Because I was comfortable with the system and the software as a service, and there was no legacy system in place when I joined CHKS, I decided to implement Salesforce.

Objectives

The primary drivers for adopting Salesforce were:

1. Lack of structured process and backbone system to support marketing, sales, account management and consultant delivery to clients

2. Lack of transparency of information across the organisation in relation to clients and the wider market

3. Lack of an audit trail of client correspondence and activities carried out with clients

4. Lack of accurate and timely management information with regards sales and marketing performance, return on investment and forecasting

5. No central and consistent repository for data (other than a variety of spreadsheets and internally generated databases)

6. No central document management for contracts, proposals and agreements with clients

Implementation

We have 40 users in CHKS, covering marketing, sales and account management, and our delivery consultants. We configured Salesforce around our core delivery process to cover the functions. Our licenses are roughly split as:

1. 5 marketing

2. 8 sales

3. 5 account management

4. 14 consultants

5. 4 administration

6. 4 management

We ran a series of training sessions for all users, and have developed a number of PowerPoint presentations ourselves for training staff on specific elements of Salesforce for our business (for example, how we want to deal with Leads v Opportunities, applying Product to Opportunities, connecting to Microsoft Outlook). We then issued all staff with the presentations (using the Documents tab on Salesforce) and have made it a standard part of the Induction process. We have a Salesforce Steering Group, but that has fallen away in recent months – which we need to reinvigorate.

Adoption and using outputs

The key aspect to successful adoption is using the outputs/information in business as usual. For example, all of our monthly sales reporting is generated from Salesforce, commissions are paid on Salesforce information, all marketing campaigns are planned and run through Salesforce, and consultants activity levels are monitored through Salesforce reporting. This is critical to the ongoing adoption levels for Salesforce, so that interest doesn't fall after an initial 'honeymoon period'.

System scope

One of the risks of adopting a system like Salesforce is trying to take on too much. We have kept the configuration as narrow as we can and have 'hidden' several fields that aren't used. We have also tried to steer clear of taking on too many new versions and developments, as this has the potential to get too complicated with users.

We are far from perfect in our adoption of Salesforce in CHKS. However, we try to do what is best for our business and try not to take on too much. It is important to always aim to keep things simple for users (as this is just part of their job, not the main purpose of their job). You have to accept that you will make mistakes along the way, as long as you try to rectify them, there is no problem.

RESPONSE FROM JEFF KAPLAN MANAGING DIRECTOR THINKstrategies, INC.

CC can be used across organizations of all sizes across any industry.

CC can substantially reduce the operating costs of non-profit organizations and extend the value of their donor funds.

Any company considering CC should start small and expand its use of these services incrementally. CC permits users to acquire HW/SW functionality in small doses to text its capabilities and applicability to the user's needs. Therefore, IT/business decision-makers have an opportunity to use CC in narrowly defined areas and then develop longer term plans to rollout it out elsewhere in their organizations on a step-by-step basis.

Integrating CC into legacy environments or with other CC offerings is considerably easier and less expensive with traditional SW/HW integration requirements. SOA is a philosophical cornerstone of CC. CC is easier to deploy and integrate because of its web services design and APIs, along with a growing assortment of third-party 'connectors' developed by companies like Boomi, Cast Iron Systems, Informatica and Pervasive SW.

Most reputable CC vendors have proven that they can safeguard customer data and their ongoing operations from security threats and disruptions.