

**Angels in Cloud -
The Emergence of a New Class of
Indie Developers**

Executive Summary

Cloud computing is poised to grow to a \$160 billion industry in the coming year. Gartner research places cloud computing at the peak of its hype cycle for 2010 and forecasts that this technology will be adopted by the mainstream in the next 5 years. The main hurdle in widespread adoption of cloud computing was the initial investment needed to build up the hardware infrastructure. With the success that Amazon has seen with its Amazon Web Services business and attempts by Microsoft and Google to enter this market it is more than likely that cloud computing will become a serious portion of the IT industry in the coming years.

With their pay-as-you-go models, cloud services offer much lower entry and exit barriers compared to traditional software development avenues. Similar to the smartphone industry, there is now a tremendous opportunity for small Independent Software Vendors (ISV's) and citizen developers to start building apps for the cloud. This growth in small independent developers will represent a disruption to the traditional players in the software industry. Already, cloud service providers such as Wave-Maker are providing codeless development platforms that allow users with little to no technical programming background to create cloud apps.

The major uncertainties are the behavior of the cloud platform providers and how much data sharing users are willing to tolerate. Platform providers will have the ability to dictate what software they will support and what rules their clients will have to follow. On the other hand end users may be more tolerant of data sharing than their enterprise employers.

Nevertheless the mainstream adoption of cloud computing services is inevitable. Traditional software developers will not be able to fill all demands for new services, especially highly customized requests. There is a significant opportunity for a new class of independent developers to fill this demand and disrupt the traditional software development industry.

Disruptive Market Segment

In 2010 Forrester Research predicted that total US spending on IT would be \$741 billion. Out of this, more than a quarter would be spent on various types of software, as can be seen in Figure 1. Estimates from previous years have put the global software business at more than \$300 billion, with more than \$200 billion of that spent on business software.

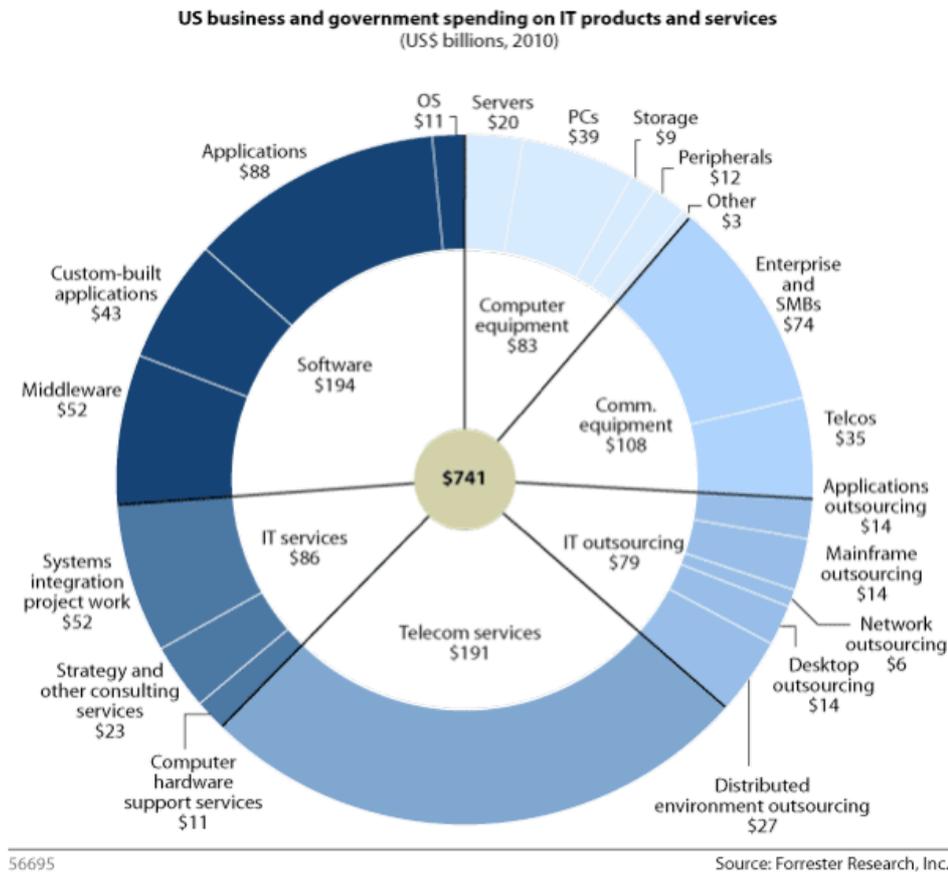


Figure 1: US Spending on IT Products and Services in 2010

Traditional software development has focused on the creation of packaged software developed by large teams of dedicated software engineers; which has then mainly been sold through retail outlets. One of the main disruptors of this ecosystem has been the emergence of cloud computing and the shifting of software services to the Internet with software being delivered primarily through the web browser. Gartner Research regularly releases a chart of depicting the maturity of various emerging technologies and how likely they are to be adopted by mainstream customers. In this hype-cycle chart for 2010 (Figure 2) cloud computing and cloud based platforms were placed at the peak of inflated expectations and these technologies are predicted to reach mainstream adoption in the next 2 to 5 years. The first major player to

enter this market was Amazon with its Amazon Web Services initiative. Building on their experience in creating the hardware and software infrastructure needed for their online retail business they began offering similar infrastructure services for other clients who wanted to provide online software services but did not want to make the substantial investments required to do so.

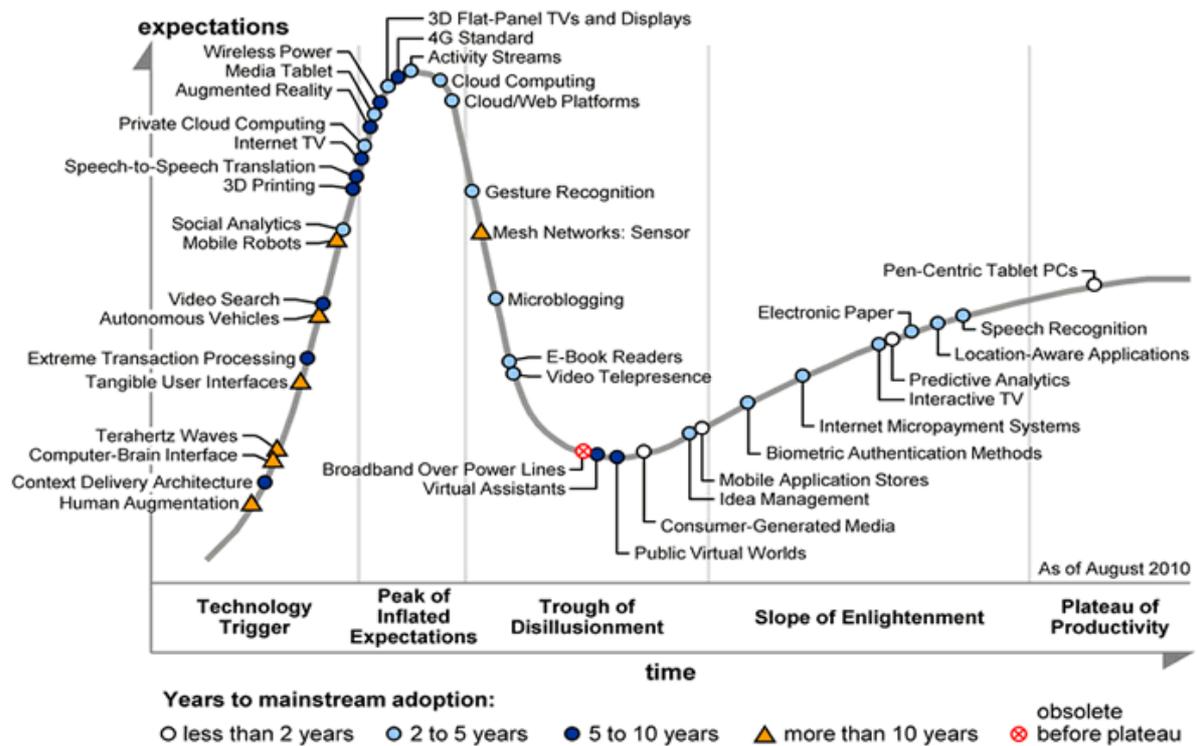


Figure 2: 2010 Hype Cycle From Gartner Research

This pay-as-you-go model significantly reduced the entry and exit barrier for developers who wanted to enter the online software industry, especially for small independent software vendors (ISV's) and citizen developers. Seeing the success that Amazon enjoyed companies such as Microsoft and Google also began to set up their own cloud computing services. This industry of cloud based infrastructure services is projected to grow into a \$160 billion market in the coming year.

At the same time that the groundwork for cloud computing was being laid out a revolution was also taking place in the mobile phone software development area. Apple had introduced the concept of an App Store, a marketplace where anyone could sell an application that they had developed for the iPhone with Apple taking a cut of the revenue. Other mobile providers soon copied this framework and today more than 3 billion apps have been downloaded from the Apple App Store itself. The average

mobile phone user downloads 27 apps on to his or her phone. The most popular types of applications being downloaded include games and social networking apps.

The rise of social networking services is representative of a third major change occurring in the IT markets, namely, the consumerization of IT. The current generation of young people entering the job market has grown up in the age of the Internet, with information being available whenever demanded. These new “Digital Natives” have a much higher IT awareness than their older peers and may not wait for traditional IT departments to provide solutions to their problems.

The combination of these three factors is indicative of a positive network effect (Figure 3). As more and more applications move to the cloud users will be able to obtain software cheaply and more efficiently than before. The growth of social media and mobile applications will make it easier for information about applications available to spread, leading to increasing numbers of applications being developed.

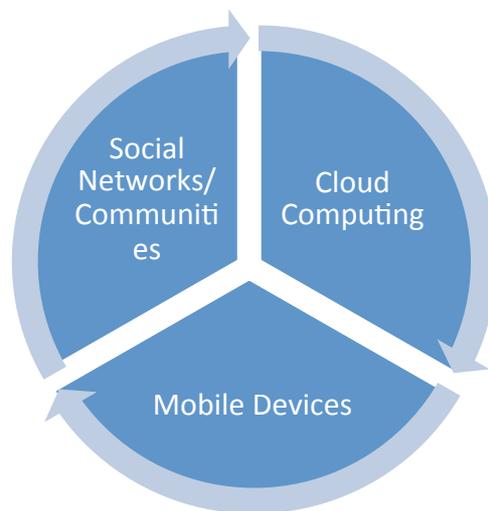


Figure 3: The virtuous cycle of cloud, mobile and social

The effects of these disruptions will affect the way software is developed. Traditional software developers often suffer from a lack of relevant business experience and spend a large amount of time understanding the requirements of software clients. With the availability of easy to use platforms on the cloud, such as WaveMaker, citizen developers have an opportunity to develop applications they need themselves. There is a “long tail” of applications that business users would like to obtain, but have not been able to due to limited IT budget constraints. Gartner Research predicts that by the year 2014 citizen developers will build at least 25% of new business applications, often using cloud based platforms such as WaveMaker. This will be a significant disruption to an industry that is currently estimated to be valued at over \$200 billion. It will also represent a significant disruption to traditional software development companies that will not be able to fill all the demands for highly customized efficient software solutions.

In the remainder of this report we take a look at the history of cloud computing, where the market stands today and where the overall trends are pointing. We will then make the case for why we believe that this emergence of a new class of small independent developers will be a significant disruption to the IT industry.

1 Analysis of Relevant Industry Background

1.1 Historical Evolution

The rise of desktop computing in the 1980s gave way to the Personal Computers (PC) based clients and servers as the preferred form of computing and was responsible for the demise of the mainframes. PC-based clients were the preferred way of building, using and deploying software for the enterprises and consumers alike. In the mid-1990s with the growth of public Internet, there was a proliferation of PC-based servers running websites and PC-based clients using the web browser software to access the services online. Slowly browsers become more pervasive and websites became more dynamic and content-driven. In the early 2000s soon after the dotcom bubble burst, it was clear that this client-server architecture of the Internet-based services was not stable. Companies like Sun Microsystems, now a subsidiary of Oracle (ORCL), which made a fortune by selling vertically integrated hardware for servers to the large number of websites were struggling to increase their revenue. Partly because of the rise of Free and Open Source Software (FOSS) alternatives like GNU/Linux and cheap PC hardware from other manufacturers. Sun Microsystems made their highest revenue in 2000 and from that year onwards started on a downward trend that ended up with its acquisition by Oracle earlier this year. In the history of evolving computing models Sun Microsystems represents pinnacle of the success of the client-server model from the server side. On the client side, the PC world was dominated by client operating systems from Microsoft (MSFT), PC hardware vendors like Dell (DELL), HP (HPQ), etc, and chipset manufacturers like Intel (INTC) and Advanced Micro Devices (AMD).

The importance of web browser as a software running on the client was increasing, this led to the browser wars in the last decade where Internet Explorer (IE) emerged as the most popular browser for the PC and captured the highest market share. The kind of content that the websites presented to users had become much more dynamic, incorporating technologies like Flash, Java, and ActiveX controls, user could much more from the web browser than ever before. As PCs were getting faster and better much more functionality of the OS have been exposed through the web browser enabling almost any website to offer applications with bet-

ter user experience. These new applications are referred to as Rich Internet Apps (RIA). The growth and popularity of Asynchronous JavaScript and XML (Ajax) led to dramatic increase in the number of websites that started to look more like desktop applications. This led to the rise of the so-called Web 2.0 phenomenon; and led to a rise in web applications like Twitter and Facebook. As web developers are exploiting the abilities of web browser to create new and interesting applications, interesting things are happening at the server side as well.

Amazon.com (AMZN) which started out as an online retailer of books in the 1990s had built a huge infrastructure to support and run their website. In 2003, they recognized that in order to run any successful large website, a lot of technology know-how and hardware infrastructure were required which included building and maintaining datacenters, providing caching for performance, geo-distribution for low latency, etc. Amazon found that by abstracting the details of stability, performance and deployment (using virtualization) from the users, it was better able to utilize its own datacenters. This prompted them to initiate a new product development effort that was released as Amazon Web Services (AWS) to external customers in 2006. The services available to users initially included a storage service S3 and a computing service EC2. This represented a shift from the client-server model, now AWS would take care of all the details and scalability and the user would be only billed for the resources used.

Cloud computing is the metaphor used to represent this shift from the client-server model to a model where Internet-based services are provided on demand to computers and devices. Over the last few years, many companies have started to provide Cloud computing services like Amazon AWS, Google App Engine (GAE) and Microsoft Azure. Some of the common features of all Cloud computing providers include multi-tenacity, scalability, reliability, maintenance and metering. Cloud computing has merged the boundaries of hardware and software by providing traditionally hardware like services say storage and computing in form of a service available over the Internet.

Over the last few years with the rise of new app platforms like Apple App Store, Mac App Store, Android Market, and others, Cloud computing has emerged as the model of choice for developers and users alike. The 2010 Gartner report on hype cycles in technology put cloud computing at its peak. It provides transformational benefits and is predicted to reach mainstream adoption in two to five years time. It should be noted that evolution of Cloud computing has not only affected the server side of the client-server model, it has also affected the PC-based client. Increasingly Internet-connected mobile devices like netbooks, tablets and smart phones are becoming the primary devices for consumption of data and information for

the consumers. This has led to the rise of application culture, which in turn has fueled the growth of individual (indie) developers. Application stores have lowered the barriers for small-scale indie developers to distribute their applications to their customers. Cloud computing enables them to scale their applications according to the actual usage thus keeping the upfront costs low.

Thus we see that the shift towards cloud computing was driven by a variety of factors, a right set of technologies (server virtualization, low power chipsets, dense packing architecture etc.) came together to deliver a set of features (multi-tenacity, scalability, reliability, rich client apps, etc.) which led to new kind of experiences (smart phone browsing, tablet, e-book readers, etc.). Similarly now that all the ground-work with regards to the Cloud computing is in place, we believe that the stage is now set for a disruptive growth in the cloud-based applications which are going to be built primarily by indie developers (and not big software companies).

1.2 Business Models

The growth of a new technology often brings about a change in the business models of companies. Cloud computing has made it possible to offer computing as a service and bill users as in an electric grid. This concept was referred to as utility computing, most of the companies providing cloud-based services use this pay-as-you-go notion of metering and billing the customer. Companies like Amazon, Google and Microsoft invested a large amount of money upfront to build the data centers in order to provide scalability and reliability to the users. On the other hand, companies like 37Signals.com and Salesforce.com provide cloud-based services but are themselves built upon other cloud computing infrastructure. The pricing and the business model used by a company may depend on the layer it provides the service. Figure 4 illustrates the different layers of the cloud computing providers.

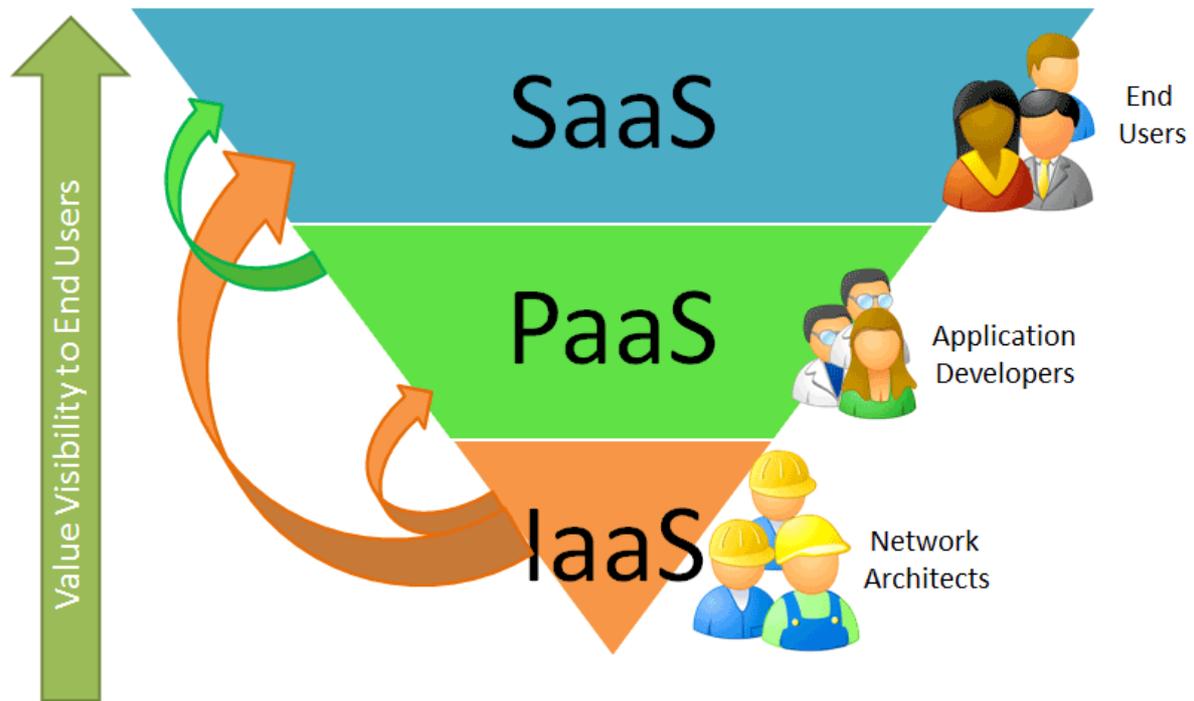


Figure 4 - Cloud Computing Layers

We briefly describe them as follows:

Infrastructure as a Service (IaaS) – Traditional computing resources like storage, network bandwidth, virtualization etc. offered over Internet in form of a service. For example, AWS.

Platform as a Service (PaaS) – An application framework, computing system and execution environment offered over Internet in form of a service. For example, Windows Azure, GAE.

Software as a Service (SaaS) – A specialized software functionality offered over Internet in form of a service. For example, Salesforce.com, 37Signals.com

The business model a company uses may depend on the layer it sits in, in the IaaS layer, companies charge for per hour of resource used, per unit of data stored or per unit of bandwidth consumed etc, while in the PaaS platform, leaders may impose charges on number of users of the application, finally in SaaS, companies typically charge for usage of the service on a per month or year basis. Application developers typically use a PaaS based service and build cloud apps that are deployed over the web. Closely related to the cloud-based business models is the development of application store economies.

In an application store, the price of an application is set by the developer and a fixed cut on each customer purchase is taken by the app store leader. This model was developed initially by Apple (APPL) for use with the iTunes store and is now used for iPod, iPhone and iPad applications. Research In Motion (RIM), Android and the upcoming Windows Phone Marketplace have adopted similar model. The success of this business model has prompted Apple to announce the availability of Mac App Store for the Macs with the next release of the Apple OS X (codenamed Lion). Many of these applications available via application stores themselves use cloud-based services to store data. This interaction of cloud-based business models with application store economy will define how developers price their applications in future and how much the cloud providers charge for their services.

1.3 Technology

As mentioned earlier a number of technological factors contributed to the rise of cloud computing, in this section we focus on the key technologies that are fueling the growth of cloud-based applications. Most of the cloud-based applications are rich clients, and to do near native application-like processing on the cloud, you need improvements in browser technology and the bandwidth availability. Over the last few years, both these areas have experienced accelerated growth. Broadband penetration has been on the rise and with the advent of 3G or 4G mobile networks; the mobile bandwidth is also finally comparable to what users get at home. This has enabled cloud applications to offer low latency and has led to new use cases like gaming as a service.

On the browser side, new standards like HTML5 and CSS3 enable web applications to behave like native applications in terms of interactivity and client storage. Advancements in browsers (IE9) allow developers to make use of Graphics Processing Unit (GPU) through the browser itself enabling better 2D and 3D graphics for web applications. HTML5 also can be used to make web apps behave like installed apps. Most of these applications have to rely on some form of cloud-based service in the backend for processing and long-term storage of data. As the Figure 1 below shows in the last few years most of the web browsers have added support for many of the HTML5 features and tags. The black line represents the native performance of applications while the blue one shows the performance of web applications using specific HTML5 features. As it is clear from this info graphic in near future the line between the native and web applications will be blurred.

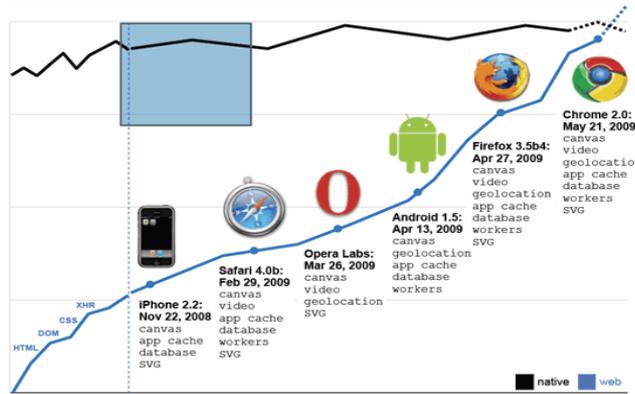


Figure 1 – HTML5 Support in Browsers

1.4 Leading Companies

Amazon.com was the first major company to offer any cloud-based service; AWS is currently the leading cloud vendor. Recently Amazon has added many other services on top of core AWS including services for payment, queuing etc. Google has been relatively slow in the offering of their cloud service; GAE was initially available only for Python but has been slowly picking up now that Java support is added to it. Microsoft has proclaimed Azure as a cloud Operating System for .NET and it is likely to get support from an already existing community of .NET developers. Salesforce.com offers an on demand CRM that is very popular among Small Medium Businesses (SMBs). It also allows developers to build applications on its CRM platform using force.com. Salesforce.com is currently the most popular SaaS application of the cloud.

In addition to this, IBM and Oracle [15] have built their own cloud services for the enterprise. Due to the very nature of providing a cloud-based service that requires big upfront investment and cost, most the major tech companies are leading in the IaaS and PaaS layer of cloud. But innovative small companies and startups like 37signals have built simple, easy-to-use applications using SaaS which are quite popular. One of the new trends in the market is the growth of application infrastructure for cloud computing. Some of the key findings of a recent Gartner report include the following.

In Cloud computing, application infrastructure is either embedded in cloud applications or is offered as application infrastructure services (AIS), also known as "platform as a service" (PaaS).

AIS or PaaS include application platforms as a service (APaaS), integration as a service, database management system (DBMS) as a service, business process management (BPM) technology as a service, portal technology as a service and other functional types of middleware.

The key differentiating features of cloud-enabled application infrastructure services and products are elastic scalability, multi-tenancy and one-to-many self-service provisioning and management.

Application infrastructure services enable companies to focus on their core capabilities and leave the rest to others. In fact another Gartner report suggests that APaaS may be the killer application for cloud computing. Whatever be the case, it is clear that application development and deployment is going to be affected in a big way with the rise in the number of cloud apps. **Figure 2** illustrates some of the leading companies in cloud computing and their moves in the ecosystem.

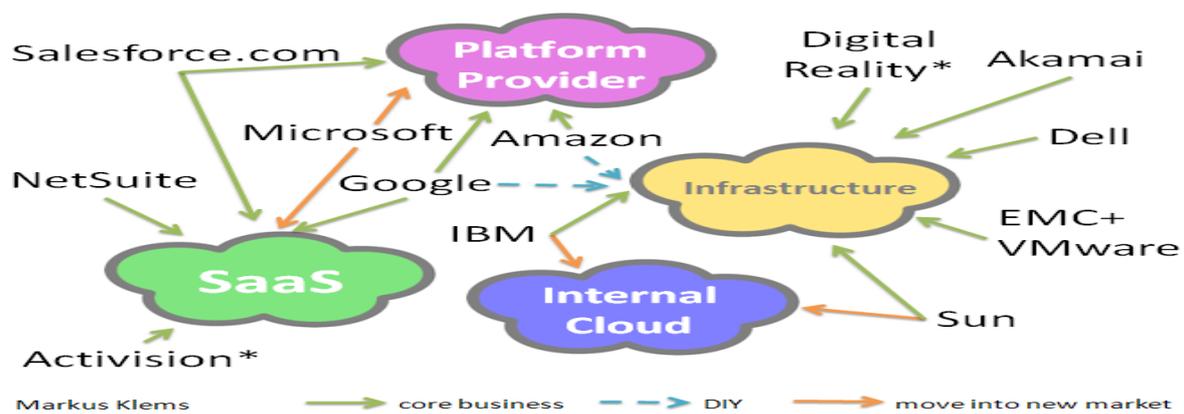


Figure 2 – Leading Cloud Computing Companies

2 Analysis of trends

2.1 Market

Originally, in 2009, Gartner forecasted worldwide cloud service market would surpass \$68 billion in 2010, a 16.6 percent increase from 2009 revenue of \$58.6 billion based on the fact that there was an acceleration of adoption of cloud computing and cloud service among en-

terprises and an explosion of technology providers to exploit the growing commercial opportunity.

Error! Reference source not found. shows the market composition of the cloud service. One obvious phenomenon is that application service provider market (SaaS) dominates the half of the whole market share. The fastest growing segments in SaaS are Content, Communications and Collaboration, Customer Relationship Management, Enterprise Resource Planning (ERP) and Supply Chain Management. The rest parts are split into infrastructure and platform (IaaS and PaaS).

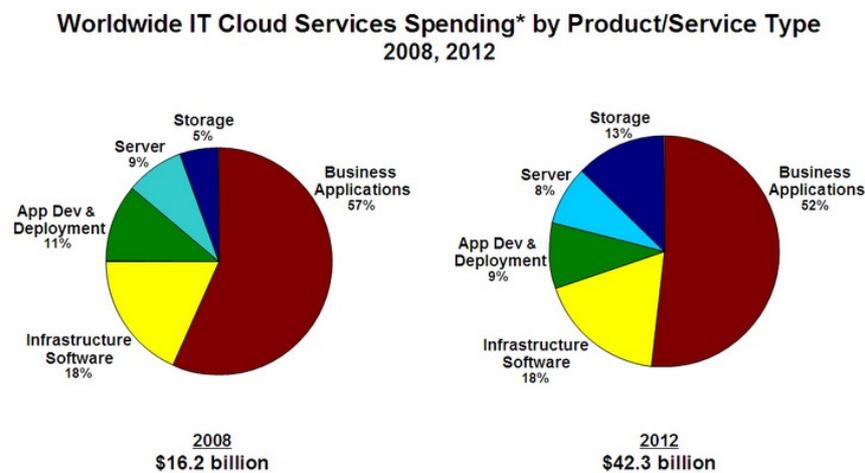


Figure 10: Market Composition of Cloud IT Spending

Interestingly, there is one opportunity in cloud computing that is not represented in the above chart. This is the emergence of application platforms as a service (APaaS) type packages. Examples of what types of services may be offered under this can be found in companies such as WaveMaker and Zoho. Both of these companies offer platforms on which users can easily develop their own cloud computing applications, with little or no prior development experience. We believe this new segment of cloud computing, APaaS, represents a major opportunity for small independent and citizen developers to rapidly build and sell their own software solutions. Figure 11 below shows where APaaS fits in the traditional model of cloud computing.

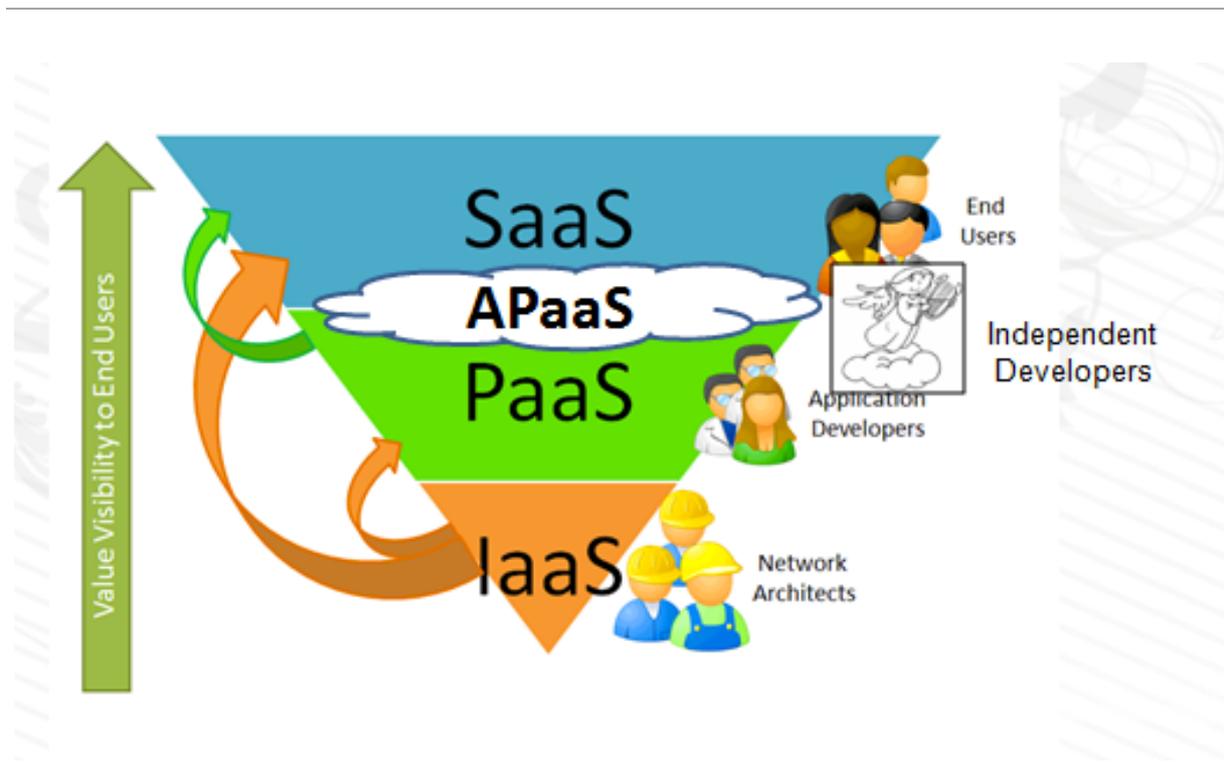


Figure 11: APaaS on the cloud

Up until now most of the investment in cloud computing has been at the infrastructure and platform level. It is expected that most of the new development will occur in cloud based software services, and especially in application platforms. In a survey of IT managers (Figure 12) it was found that almost all IT departments planned to increase spending to develop more applications, reinforcing the notion that the cloud app market is poised for rapid growth.

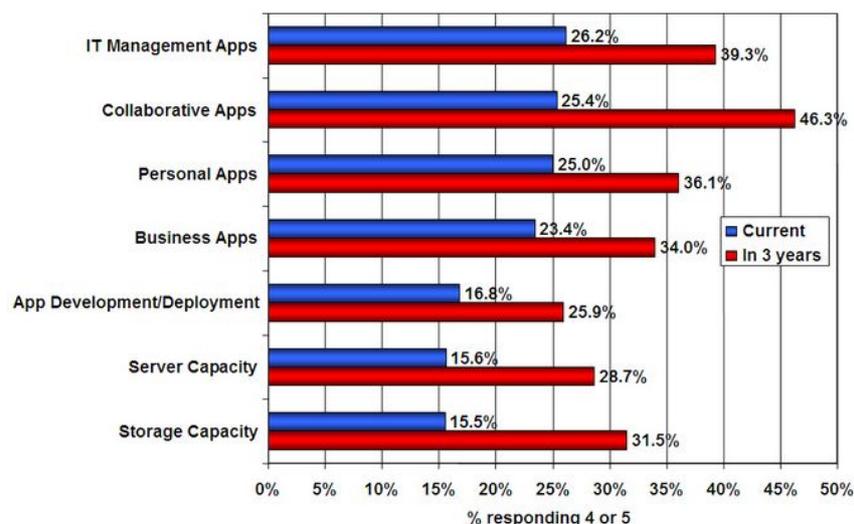


Figure 12: Projected increase in IT spending

Companies such as WaveMaker and Zoho provide easy to use drag-and-drop interfaces that allow users to easily build and deploy their applications on the cloud. In Figure 13 we show the overall model used by WaveMaker. The WaveMaker Studio allows users to develop their applications using traditional standards such as Spring, Hibernate and Dojo while also providing access to resources from salesforce and google. Additionally, WaveMaker provides a full range of cloud infrastructure services such as an app store and integration with other services. This significantly reduces the burden of developing and deploying apps and will make app development attractive to non-expert users.

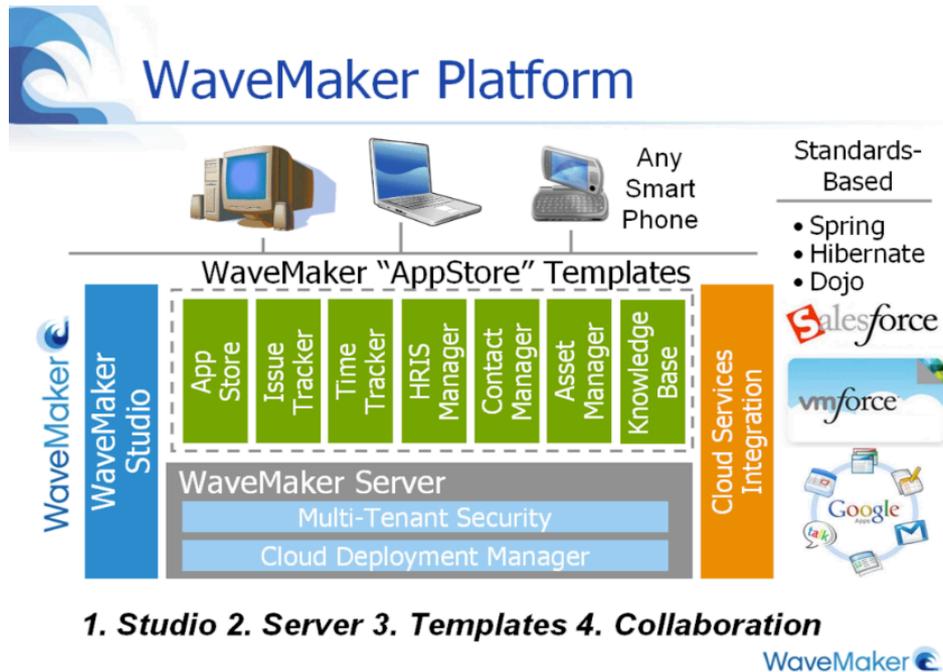


Figure 13: WaveMaker Platform

Cloud computing has brought about changes in the way mobile applications operate in terms of data storage and processing outside of the mobile phones. Indie developers embrace cloud computing because it lowered the barrier of entry and brought them more opportunities to distribute and scale their applications beyond the capabilities of existing mobile phones. This helped fuel the success of application platforms like Apple App Store and Android Market.

2.2 Socioeconomic

In this section, we are interested to study and analyze how cloud-based applications affect our social lives, especially in the way we behave in terms of our purchase intent and decisions, and also in the way we choose to spend our time. We will also look at the current economic

climate and see how it has affected the way people make their choices to go leaner and pay only for what they use.

2.2.1 The rise of an apps-based culture

There is a change in attitude towards paid mobile applications. Unlike in the desktop space where people are less willing to spend money on applications, people are actually more compelled to pay for applications on their mobile phones. Why is this so?

AdMob is a popular mobile advertising network that serves banners and text advertisements. Google recently acquired them to extend their search advertisement strategy to mobile websites and applications. They did a mobile application usage survey last January this year that uncovered numerous interesting statistics about users and their mobile application usages.

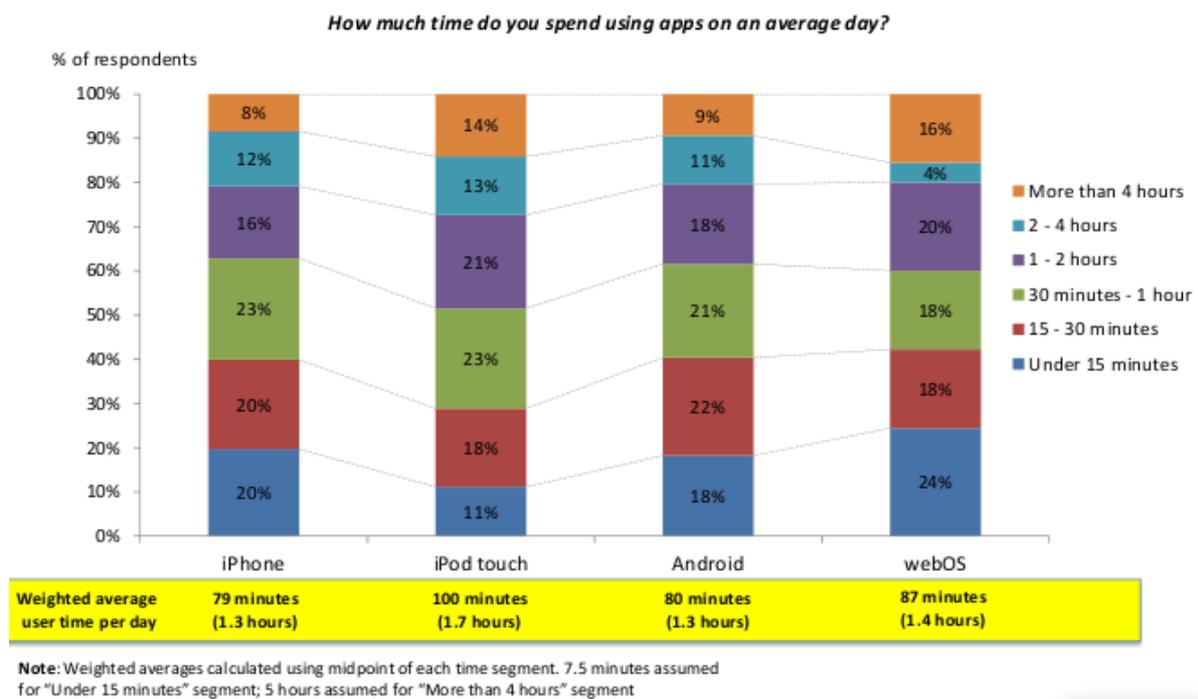


Figure 6: Time spent on apps per day

It turns out that people are spending a lot of time in front of their mobile phones with iPod touch users spending the most, iPhone and Android users spend an average time of 79 to 80 minutes using applications, while webOS users spend seven more minutes each day.

	Average amount spent on paid apps per month by paid app purchasers	Average number of paid apps downloaded per month by paid app purchasers		Average app purchase price
iPhone users	\$8.18	3.6	↓	\$2.27
iPod touch users	\$11.39	4.6	↓	\$2.47
Android users	\$8.36	5.0	↓	\$1.67
webOS users	\$9.55	2.5	↓	\$3.82

Figure 7: Amount spent on apps

On average, iPod touch users are more likely to spend more on applications with an average amount spent of USD\$11.39 per month as compared to USD\$9.55 for webOS users, USD\$8.36 for Android users and USD\$8.18 for iPhone users. Also, Android users tend to buy more applications every month with an average of 5 per month as compared to 4.6 for iPod touch users, 3.6 for iPhone users and 2.5 for webOS users. This works out to be an average application purchase of USD\$1.67 for Android users, USD\$2.47 for iPod touch users, USD\$2.27 for iPhone users and USD\$3.82 for webOS users.

Flowtown, a social media marketing platform, also did a survey in September 2010 to find out the habits of mobile users.

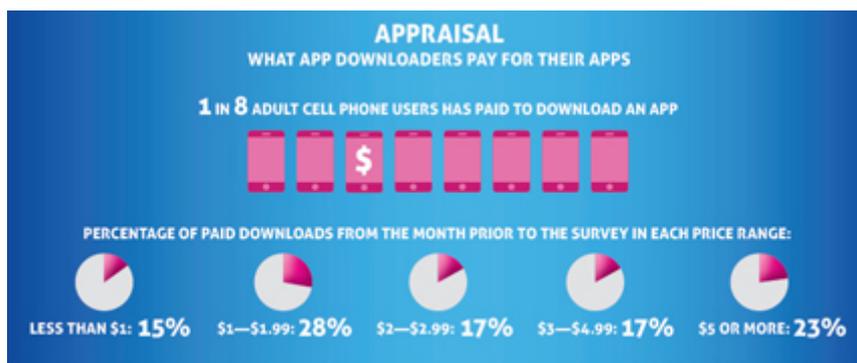


Figure 8: What app downloaders pay for their apps

From the results, we can see that one out of eight adult cell phone users pay to download an application. 28 percent of the paid downloads from the month prior to the survey is within USD\$1 to \$1.99 price range, 23 percent within USD\$5 or more, 17 percent within USD\$2 to \$2.99 and USD\$3 to \$4.99, and 15 percent within a dollar.

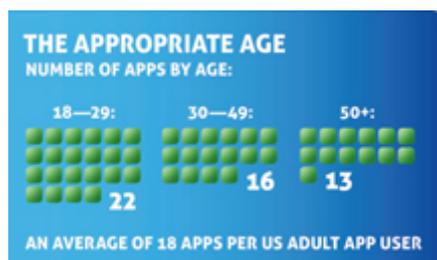


Figure 9: Number of apps by age

We also find that the younger you are, the more applications you are likely to install, with about 22 applications on average for age group between 18 to 29, 16 applications for age group 30-49, and 13 applications for age group beyond 50.

Through these survey and statistics, we can have a better understanding why people are more compelled to pay for applications and less inclined to spend any cent on the desktop. First of all, the desktop provides a platform for people to install and remove software as and when they want, easily, and the source of the software is not limited nor restricted to the desktop itself, mostly, and the prices of the applications are usually a lot more expensive than mobile applications. If they do not want expensive software, there are many alternatives available on the Internet that are shareware or freeware or even open source software that they can download and install for free at anytime they want. In the desktop space, there are generally more application choices that meet peoples' demand for them. And if they want to buy software, they have to either buy it from computer stores at shopping malls or online either buying from the vendors directly or via third-party websites.

On the other hand, people use mobile phones for most of the day and therefore they are more willing to pay for digital goods that can help improve their overall mobile phone experience. Mobile phone applications are a lot cheaper than desktop applications, so people, even the youngsters, will feel less of a pinch if they were to buy an application from the Apple App Store or Android Market. People are now getting used to one time smaller costs. Application platforms like Android Market even provide a 24-hour money back guarantee so that if you do not like the application you bought, you can request for a refund and the amount you paid for the application will not be charged to your credit card. Application platforms have made it very easy for people to pay for applications. With a couple of clicks, and you will be able to download the application and use it right away. The choices of applications are not a lot, so

there are more demand than meets the supply. This is the kind of phenomenon that we do not see in the desktop space. Recently Apple tries to change that by introducing a similar application platform in iPhone onto their desktop operating system, called Mac App Store in order to replicate this phenomenon seen on their iPhones.

2.2.2 The current economic climate

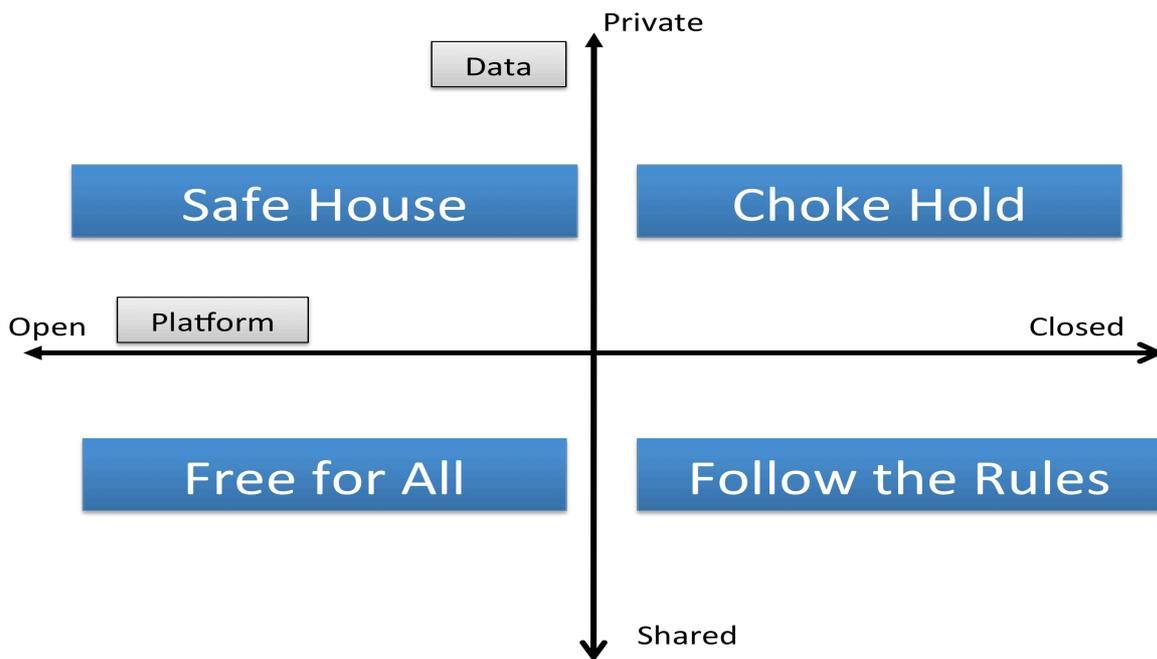
The current economic crisis might have accelerated the take up of cloud computing. Companies are looking at a better efficient way to maximize their capital investment on their technology infrastructure. Rather than spending money to buy hardware and software that they cannot fully utilized over a period of time, they turn to cloud computing where they can better leverage and pay for only what they use, and rechanneled the money they saved to provide a better service and customer experience. This indirectly helps to improve the quality and availability of services, which in turn improves peoples' lives. The CBA bank is one good example, where they make a shift towards cloud computing to better utilize their infrastructure needs, so that they can bring new services to their customers. They shared that it is not about technical breakthrough but about supplying to customers the services they want and doing that at value.

Overall, it can be seen that users have become more demanding on the amount of time required to obtain software that fulfills their needs, and are willing to circumvent traditional IT procurement procedures in order to save time. This on-demand mentality represents a great opportunity for independent and citizen developers to rapidly develop and sell niche software as it is demanded.

3 Scenarios

As described in the sections above there are several factors which will influence how quickly cloud computing services developed by small independent citizen developers emerge as a disruptive force to traditional software companies. One of the major factors will be the roll of traditional software players such as Microsoft, Apple and Google. Currently these companies have been more interested in providing a platform for cloud apps, instead of actively building cloud apps themselves. Although both Google and Microsoft have provided some of their enterprise applications (Google Docs, Office Web Apps) on the cloud, there is still a lot of opportunity for small independent software developers to move into this market. However, since the platform will be controlled by the larger companies they will ultimately have the power to decide which apps they allow to run on their platform. How open or

restrictive the platform providers will be in this area remains a major uncertainty. The second uncertainty is how users want to treat their own data. It is conceivable that “Digital Natives” will be more comfortable with sharing multiple aspects of their personal and professional lives. There may be a preference to log into Facebook accounts at work and use that as both a personal and professional portal. However on the opposite side corporations and enterprises will demand that data be kept private and not be shared. A further dimension to the sharing of data is how it will be shared between diverse applications running on different cloud infrastructures. The chart below highlights the four major scenarios that may take place based on the two uncertainties described above.



Starting from the top right quadrant and moving clockwise we encounter several scenarios. The first one is probably the worst case, where cloud infrastructure providers will tightly control their systems and data will be kept private. This “Choke Hold” situation will be the most stifling and goes against the on-demand nature of young digital natives. The second scenario will be most favorable to enterprises, where they are free to run a diverse range of apps on different cloud platforms while their data is kept secure and private in a “Safe House”. The next option is more egalitarian in its approach with both platforms and data being shared openly in a “Free for All”. And finally the last scenario represents a mismatch with cloud platform providers refusing to open their systems while users don’t mind sharing data. In this scenario the users would have to “Follow the Rules” set by the platform providers.

From this analysis it is clear that scenarios two and three would be most beneficial from the point of views of enterprise and consumers respectively.

4 Conclusions and Recommendations

In this report we have covered the evolution of cloud computing services and how after a period of infrastructural investment the market is poised for rapid growth in the development of software as a service type applications. The consumerization of IT through the emergence of social networking and mobile applications has changed the way users are obtaining and using software. Combined with the availability of WaveMaker type platforms that make cloud app development easy there is a huge opportunity for the emergence of a new class of small independent citizen developers to step in and disrupt traditional software companies.

It is predicted that these citizen developers will be building at least 25% of business apps by the year 2014. This will represent a significant challenge for IT departments who will no longer be able to exercise full control over which software is being used in their companies. IT managers will have to make significant efforts to educate end users about the risks of independent development and try to establish formalized guidelines aimed at reducing duplication of effort and security vulnerabilities.

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