

Spring 6-20-2012

Cloud Computing Adoption in German Internet Start-up Companies

Ivo Stankov

Europa-Universität Viadrina Frankfurt (Oder), Germany, stankov@europa-uni.de

Yevhen Miroshnychenko

Europa-Universität Viadrina Frankfurt (Oder), Germany, eugenmir@gmail.com

Karl Kurbel

Europa-Universität Viadrina Frankfurt (Oder), Germany, kurbel.bi@europa-uni.de

Follow this and additional works at: <http://aisel.aisnet.org/bled2012>

Recommended Citation

Stankov, Ivo; Miroshnychenko, Yevhen; and Kurbel, Karl, "Cloud Computing Adoption in German Internet Start-up Companies" (2012). *BLED 2012 Proceedings*. 37.

<http://aisel.aisnet.org/bled2012/37>

This material is brought to you by the BLED Proceedings at AIS Electronic Library (AISeL). It has been accepted for inclusion in BLED 2012 Proceedings by an authorized administrator of AIS Electronic Library (AISeL). For more information, please contact elibrary@aisnet.org.

Cloud Computing Adoption in German Internet Start-up Companies

Yevhen Miroshnychenko

Europa-Universität Viadrina Frankfurt (Oder), Germany
eugenmir@gmail.com

Ivo Stankov

Europa-Universität Viadrina Frankfurt (Oder), Germany
stankov@europa-uni.de

Karl Kurbel

Europa-Universität Viadrina Frankfurt (Oder), Germany
kurbel.bi@europa-uni.de

Abstract

Because of its flexibility and cost-effectiveness, cloud computing has the potential to be a beneficial solution for Internet start-up companies. These companies often face uncertain growth rates and cannot afford an up-front investment in a dedicated IT infrastructure. Based on the results of a survey, this paper investigates to what extent current cloud computing solutions have actually been adopted, or are considered for adoption, by German Internet start-up companies. The findings show that many companies have already accepted and implemented cloud computing, even for core business functions and processes. However, there is still a very sizeable group of decision-makers who would not consider outsourcing core processes to the cloud. Issues like data security and privacy are among the main adoption hurdles.

Keywords: cloud computing, start-ups, adoption, IaaS, SaaS, PaaS

1 Introduction

One of the main benefits of cloud computing is that computing capabilities are used and paid for as a service. In other words, the pay-per-use model allows companies to make use of advanced computing resources without bearing the purchasing, set-up and operating costs. The elasticity of the provided service makes sure that only the needed resources are being used and paid for. This is particularly attractive for small start-up companies.

The "Internet start-up company" is a specific type of company that has emerged with the growth of the Internet. This term is used to describe companies that are relatively young (operating for up to 3 years), with a 6-digits yearly turnover, a small number of employees (up to 50), and which run their business through their website on the Internet. Most Internet start-up companies operate with the help of venture capital. Start-ups often have innovative yet risky business models, and return on investment is rarely guaranteed. Furthermore, the growth rate of the business is very hard to predict. It can be slow for some start-ups and extraordinarily fast for others.

The capability to scale up (or down) the computing infrastructure and/or application usage is an important feature for Internet start-up companies. Many of these companies, especially in their early stages, are unstable and have to cope with tight budgets. Nevertheless, they have to provide high-quality service from the very beginning in order to gain traction within their market. Naturally, the number of customers will be small in the early stages, but like most businesses, start-ups are aiming at rapid growth.

The ability to serve a rapidly growing population of customers, in other words to scale up seamlessly, is an important strategic consideration for a start-up company. Buying the powerful hardware infrastructure that might only be needed later up-front and expending significant financial funds immediately would overburden many a start-up company. Therefore, a cloud solution can be quite attractive.

For an Internet start-up, the cost of running their business on a cloud will initially be relatively low because most likely they will have only a few customers. If the business grows, the provider will allocate more resources. In the case of fluctuating demand, the start-up will be able to elastically scale its offer up or down. The company will have to worry less about infrastructure cost and be able to concentrate more on developing their core competencies.

Considering this, it is evident, that cloud computing, with its promise of seamless elasticity, and pay-per-use model, can be enticing for up and coming start-up

companies that have a tight budget but aim at rapid growth. It has been shown previously that the factors that cloud computing brings can be very positive for innovation (Martson et. al., 2011) and useful in a business sense (Smith, 2009).

This paper investigates the adoption of cloud computing in German Internet start-up companies. First, we will give a brief outline of the survey we conducted to investigate the current and potential use of cloud computing in recent Internet start-ups. Section 3 discusses the findings from the survey. In the last section, we summarize our conclusions and point out areas for further research.

2 The Survey

A survey of German Internet start-up companies was conducted in December 2010 and January 2011. Relevant companies to be contacted were identified mainly with the help of two German websites: Deutsche-Startups (2010) (which was also used in a study by Kollmann, Häsel and Breugst, 2010) and Gründerszene (2010). The two sources are authoritative online databases regarding the German Internet start-up scene.

2.1 Overview of the Survey

Since cloud computing has only recently become a popular business practice, we concentrated on companies founded in the last few years, i.e. between 2008 and 2010. Based on the websites mentioned above, information from approximately 353 Internet start-ups was collected, stored in a database and used to create a mailing list.

Our first finding after initiating contact was that 26 companies were no longer in business. An immediate conclusion from this is that at least 7.3% of German Internet start-ups failed within the first three years of operation. Thus the final survey group included 327 companies.

2.1.1 Preferred Geographical Location

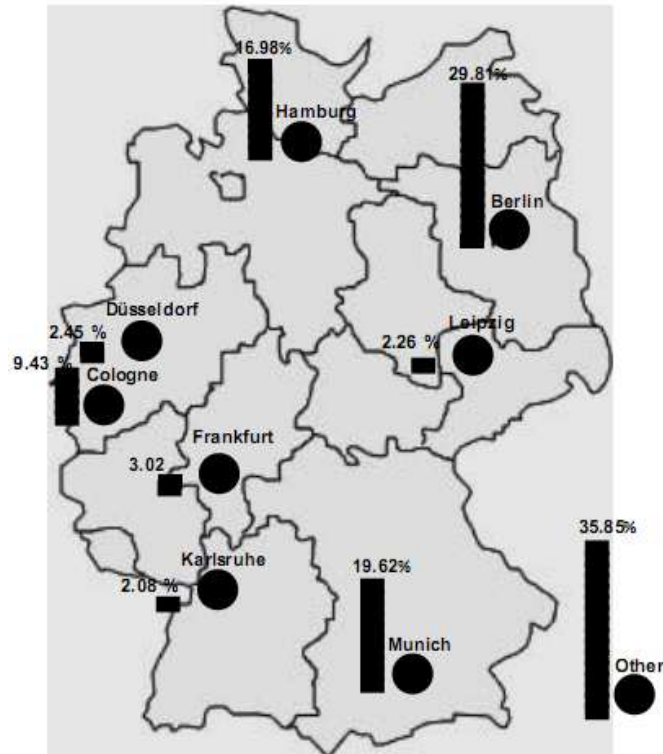


Figure 1: Preferred geographic locations of German Internet start-ups

The gathered data were analyzed with respect to the geographical location. As a result, the top eight preferred start-up locations in Germany were identified and ranked, as shown in figure 1. Almost one third (29.81%) were founded in Berlin. The second most popular city for Internet start-ups is Munich, with 19.62%. Hamburg ranked third, with 16.98%. Other big cities such as Frankfurt, Cologne and Düsseldorf are also represented, yet with smaller numbers.

2.1.2 Survey Structure and Response Rate

We received 37 questionnaires in response to our invitation to participate, corresponding to a response rate of 11.3%. Six questionnaires were not completely filled out. Therefore, some questions have fewer than 37 answers that could be included in the analysis.

The questionnaire addressed primarily two types of respondents: a) business owners and senior managers (e.g. CEOs), because we were interested to find out what the strategic vision of the company is, and b) IT managers (e.g. CIOs, CTOs) because their understanding of technology issues is crucial in the context of cloud computing adoption.

The structure of the questionnaire is presented in figure 2. The first block of questions (“General Information”) contained eight introductory questions to obtain information about the company. Question 8 of this block asked respondents whether the company they represent was familiar with the concept of cloud computing or not. Respondents answering “Yes, we are already using cloud computing in our business activities” were lead to scenario A. In this scenario, current users were asked questions about cloud computing in general and the adoption of cloud computing in their company.

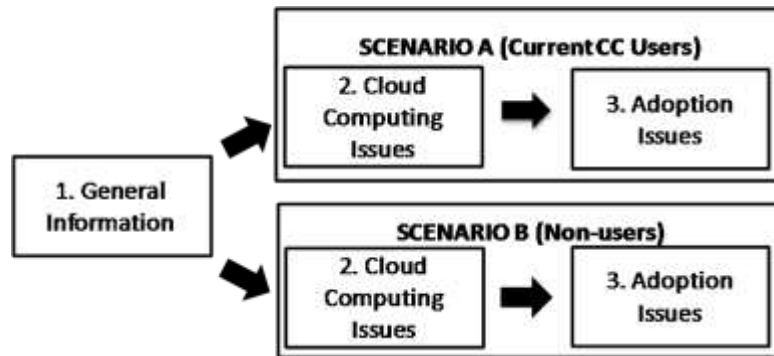


Figure 2: Questionnaire structure

Scenario B was initiated when the respondent chose one of the other three possible answers to question 8, i.e. “Yes, we have heard of the term, we know what it is, however we do not use it”, ”Yes, we have heard of the term, however we do not know what it is”, or ”No, we don’t know what it is”.

2.2 General Observations

2.2.1 Overall Cloud Computing Usage

According to the survey, 39% of German Internet start-up companies currently use cloud computing in their business activities. This number seems to contradict the results of other surveys on the topic of cloud computing. A survey conducted by the IDC group (IDC, 2009), for example, found that only 7% of companies polled were currently using cloud computing technology. However, the IDC group only surveyed companies with more than 100 employees. Furthermore, these companies were not specifically Internet companies, but companies from a variety of different business sectors.

Our results show that in German Internet start-up companies, cloud computing plays a relevant role. The fact that cloud computing is more prevalent among Internet start-ups than among more traditional companies could be explained by the nature of the Internet start-up industry and the probably faster technology adoption rate in this industry.

Another 56% of respondents are familiar with cloud computing technology, but do not

use it in practice. Only 5% have never heard of cloud computing, which might indicate that it is not relevant for their business model. The results are presented in figure 3.

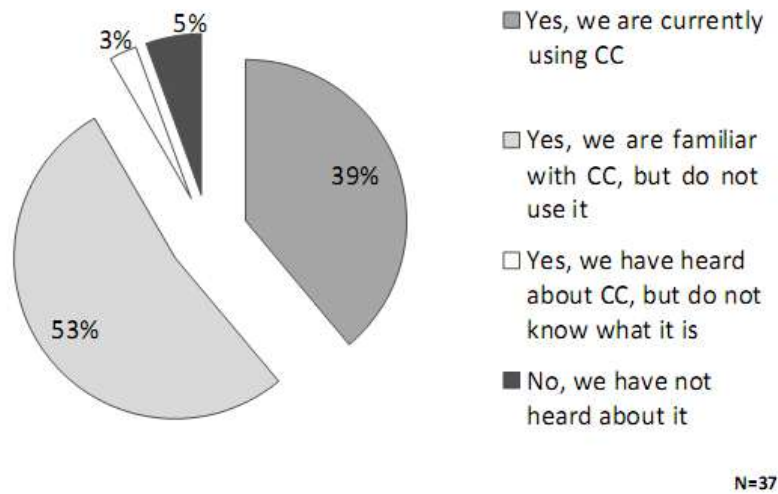


Figure 3: Survey results – cloud computing usage in German Internet start-ups

2.2.2 Start-up Business Models

In order to analyze which start-ups tend to use cloud computing more than the others, we used Laudon & Laudon's classification (2010) of the most popular Internet business models, extended by one category which is not included in this classification (i.e. search engines): virtual storefront (online shop), information

broker, transaction broker, online marketplace, content provider, social network, portal, service provider and search engine.

From figure 4, it can be seen that in 2010 there was a reduction in almost every category except online shops. In 2010, the most popular business model was the online shop, which was used by more than 30% of start-up companies. The information broker model has remained more or less the same over the last 3 years, although a slight decreasing tendency can be seen.

The content provider business model was very popular in 2008 and 2009, but by 2010 fewer companies were using it. Another interesting fact is that among the group of respondents, there were no social networks or online communities in 2010. This could be explained by the high level of competition and the risks associated with this business model. The number of companies with an online marketplace model remained stable from 2008 to 2009, whereas in 2010 there was a significant decrease.

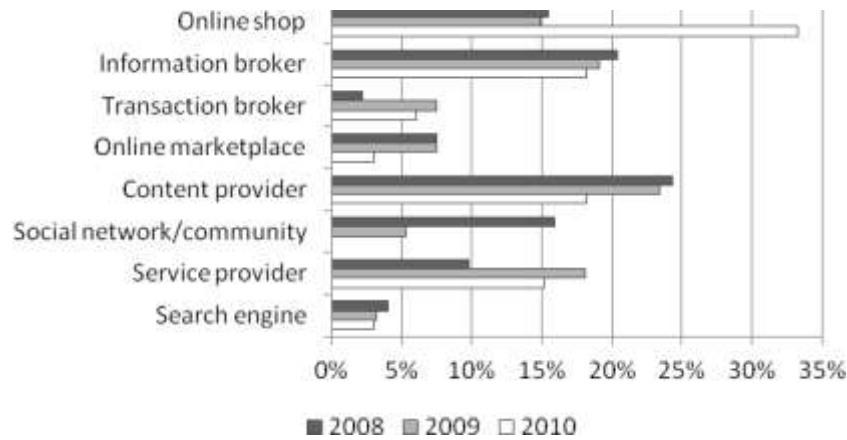


Figure 4: Survey results – preferred business models of German Internet start-ups

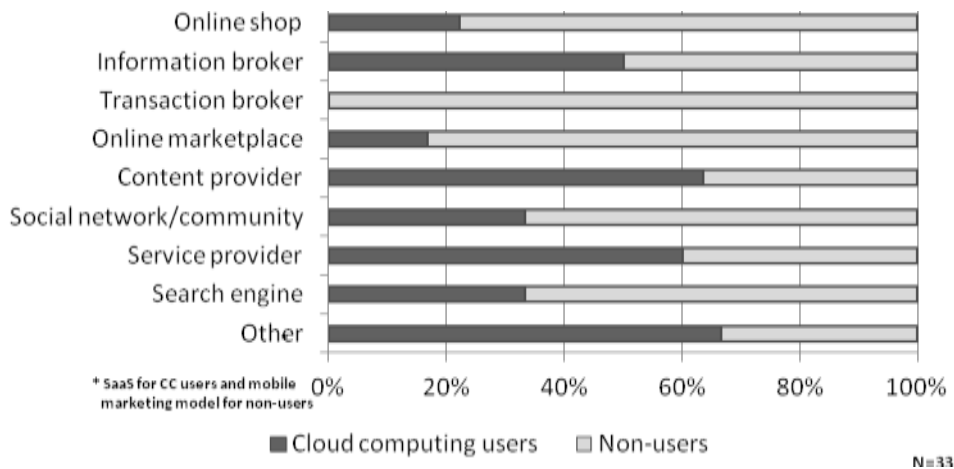


Figure 5: Survey results – Internet business model of cloud computing users and non-users

The eight categories were analyzed with respect to their current usage of cloud computing. From figure 5, it is evident that current cloud computing users are primarily content providers or service providers. These types of business models either provide digital content (such as news, photos, music or video) or services (such as photo and video sharing) for their customers. Companies that use other business models tend to not use cloud computing as often. It can be concluded that content and service providers are more inclined to use elastic cloud services in order to avoid the high up-front investment for a dedicated infrastructure. Elastic cloud services allow these companies to respond to demand fluctuations.

2.2.3 Website Popularity

Another important indicator for Internet start-ups is the number of website visitors per day. As shown in figure 6, a large portion of the German Internet start-ups that responded in the survey have a significant or even very high number of visitors. Only unique visitors were counted. Among the respondents of the survey, 20 out of

28 companies responded that they have more than 1000 unique visitors per day. 12 out of 28 have more than 3000 visitors. Only one company has less than 100 visitors, whereas five attract up to 500 and two companies up to 1000 visitors each day.

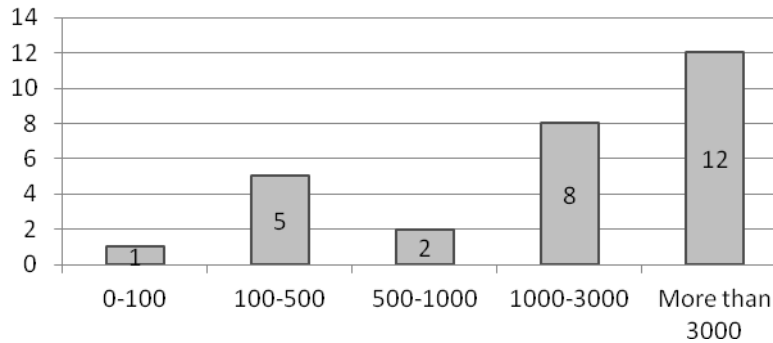


Figure 6: Survey results – number of website visitors per day

3 Key Findings from the Survey

3.1 Deployment and Service Models

In this section, the use of deployment models and service models of cloud computing will be investigated. *Deployment models* include: private clouds, where the IT cloud infrastructure is created only for one organization; public clouds, where everyone has access to the same services in a multi-tenant setup; community clouds, where cloud resources are shared between several business organizations; and hybrid clouds, which are a combination of two or more models described above (Armbrust et. al., 2010). The different types of *service models* include Infrastructure-as-a-Service (IaaS), Platform-as-a-Service (PaaS) and Software-as-a-Service (SaaS).

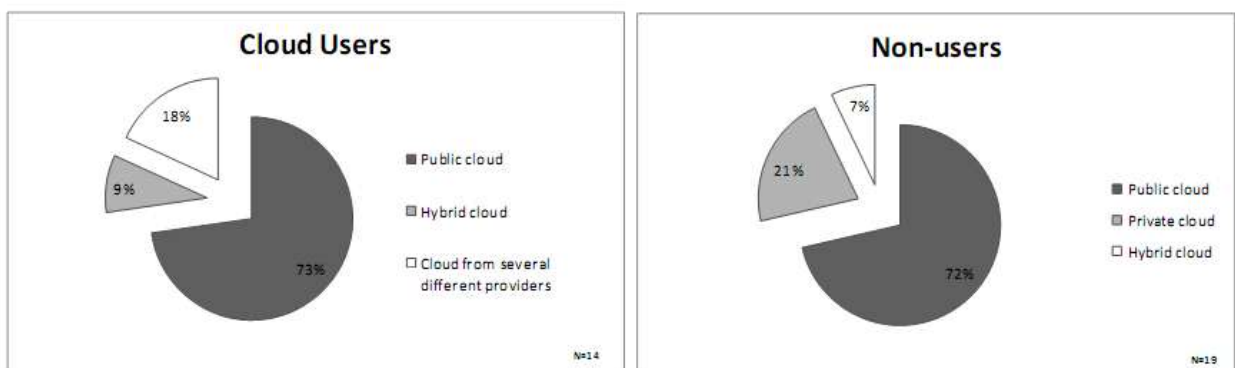


Figure 7: Survey results – used and preferred cloud deployment models

Public clouds are the most popular deployment model among German Internet start-ups using cloud computing (see Figure 7). 73% of the respondents chose this type of

model. The private cloud model was not mentioned by any company. About 9% of the respondents selected a hybrid cloud model. 18% preferred to use cloud computing services from several different providers.

Start-ups that are currently *not using* cloud computing chose public clouds as the most popular potential deployment model (72%). The second most popular model is the private cloud (21%). A hybrid model would be a reasonable solution for 7% of the respondents.

Current users and non-users of cloud computing seem to show similar attitudes concerning the deployment model. This is not surprising, taking into consideration that all of the respondents are small companies that can benefit from the flexibility and price levels of public clouds, but are usually unable to run private clouds because of the cost, technology and level of organization involved. The fact that non-users show a higher preference for private clouds than users could be explained by the lack of actual experience in implementing cloud services and the general understanding that private clouds are more secure.

Figure 8 describes used and preferred cloud service models. Among current cloud users, the Infrastructure-as-a-Service model is the most popular for Internet start-ups in Germany. 44% of the respondents are currently using IaaS in their business activities. This service model appears to be the most basic one – cloud consumers purchasing computing power, storage, processing and other resources (Durkee, 2010). The cloud provider is responsible for the infrastructure, while the cloud customer controls the operating systems, deployed applications and storage.

Indeed, as start-ups often do not initially have sufficient funds to buy the necessary IT infrastructure, this model seems to be reasonable and beneficial for them. Software-as-a-Service and Platform-as-a-Service models each attracted 26% of the respondents. These companies obviously find running software that is already installed on a server easy and convenient to use. About 5% of the respondents were interested in security cloud computing services, which probably means that they would consider working with a cloud provider specialized in security services.

The results from non-users were split almost equally. 35% of the respondents selected IaaS, whereas PaaS and SaaS were each chosen by 30%. Another 5% preferred to use cloud computing security services.



Figure 8: Survey results – used and preferred cloud service models

3.2 Core Business Processes in the Cloud

The survey did not specify what was meant by “core business processes”, the participants were expected to provide information about cloud usage of what they think were the core processes of their respective start-up. Surprisingly, despite many doubts and concerns among current cloud users (see section 3.5), 82% of respondents have moved their core business activities to cloud providers (see figure 9). This rate is quite high, and was not expected. Only 18% of the respondents preferred not to delegate their core business activities to third parties.

An opposite trend was observed among current non-users: 80% said that they would not move core processes to third parties, whereas 20% said they would. This result was expected, indicating that companies that are not using cloud computing might have made an informed decision against entrusting their core data and functions to an external provider. On the other hand, the current users of cloud solutions seem to be quite comfortable with trusting their cloud computing provider.

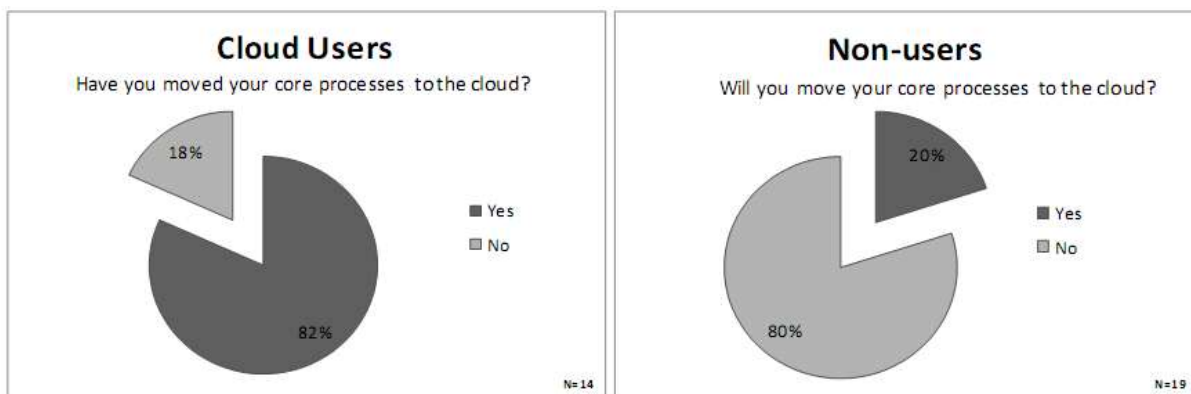


Figure 9: Survey results – users' and non-users' views on core processes in the cloud

3.3 Applications in the Cloud

The participants in the survey were asked to identify business processes or applications that they have already moved to the cloud. The results are presented in figure 10. Among current

cloud computing users, data storage was the most popular application area that was out-sourced to cloud providers. Application hosting and server capacity were chosen by eight respondents each, ranking them at second. In general, companies tend to use cloud computing services primarily for technical solutions such as hosting and server capacity, an observation also supported by section 3.1. More business-oriented application areas, such as sales, marketing and CRM, are implemented less often.

Internet start-ups that did not move their applications to the cloud were asked to weight the applications on a 5-point Likert scale, where 1 was the highest rating, meaning the application was considered most suitable for moving to the cloud, and 5 was the lowest rating, meaning the application was the least suitable. The results were summarized and an average rating for each application was calculated.

A spider chart illustrating the results is presented in figure 10. The application most likely to be moved to a cloud by non-users is server capacity. This aspect received 2.29 points. The second application that respondents would like to move was application hosting with 2.58 points. Companies tended to rate infrastructure services higher than business applications. However, CRM applications also made the list with an average of 2.60

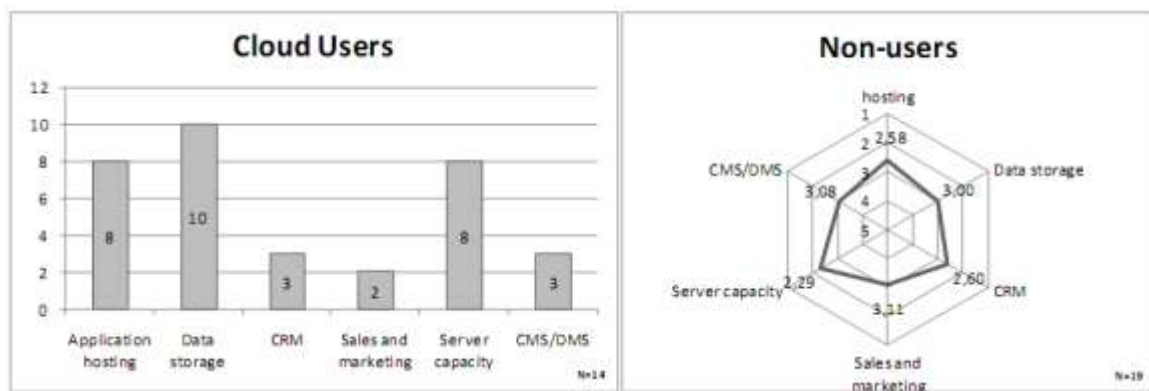


Figure 10: Survey results – used and preferred applications in the cloud

3.4 Key Adoption Factors

Respondents were asked to evaluate the factors that influenced their decision to use cloud computing according to the 5-point Likert scale. The factors were: cost savings, better scalability, advanced technology, better functionality and more flexibility. The results were summarized and an average value for each factor was calculated. The spider chart illustrating the results is presented in figure 11.

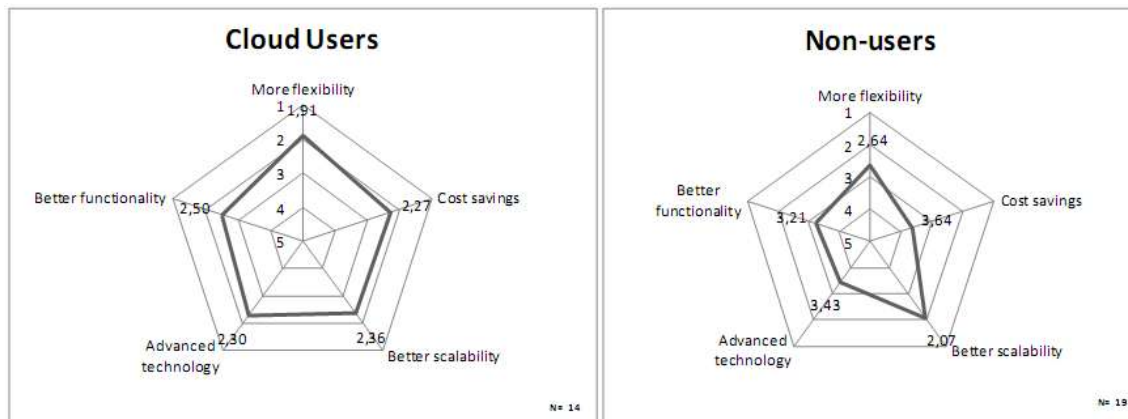


Figure 11: Survey results – key adoption factors of both groups of respondents

For current cloud computing *users*, flexibility is the most important adoption factor. It received an aggregated average rating of 1.91. Cloud computing allows businesses to quickly and easily acquire computing power, storage and network bandwidth, which is a significant advantage over an in-house data center. This technology gives start-up companies flexible access to a modern and expensive infrastructure, without having to invest too much money (and time) up-front. This finding supports the initial consideration pointed out in the beginning of the paper: the flexibility that is inherent in cloud services is an attractive proposition for dynamic start-up companies.

The cost savings factor received 2.27 out of 5 points, and is the second most important factor for cloud users. Advanced technology and better scalability were scored at 2.3 and 2.36 respectively.

For companies that are *not using* cloud computing in their business activities, the most important adoption factor was the *scalability*. The platform's ability to respond to demand by expanding automatically and the payment model are key elements of cloud computing. On an hourly or subscription basis, companies have access to as much computing power as is needed. In this model, capacity can be added or subtracted as demand increases or decreases. This is crucial for start-up businesses that cannot predict usage peaks. The scalability factor received 2.07 points. The finding shows that even non-users are aware of the flexible scaling options clouds provide, but apparently have decided not to implement these solutions because of other issues.

3.5 Adoption Barriers

Many concerns still exist regarding cloud computing adoption. This section examines the possible obstacles that prevent German companies from adopting cloud computing on a broader scale.

The companies were asked to evaluate possible adoption barriers on a 5-point Likert

scale, with 1 being very important for the adoption process (indicating a very large obstacle), and 5 being the least important (indicating a minimal obstacle). An average score for each barrier was determined for both groups of respondents. The results of this calculation are represented in the spider chart of figure 12.



Figure 12: Survey results – biggest adoption barriers for both groups of respondents

The two aspects with the lowest level of acceptance by current cloud computing users were privacy and security, with scores of 2.1 and 2.3, respectively. They are the most problematic areas for cloud computing in Germany today. This finding was also confirmed among the second group of respondents, non-users, who considered privacy and security aspects to be the biggest obstacles to adopting cloud computing, with scores of 2.50 and 2.40.

Most companies consider their data very sensitive, which is why they are afraid of hosting them on an unknown external server that is also available to other companies. Concerns about the physical location of the servers are another disturbing factor. In cloud computing, customers often do not know where their data are stored.

Although cloud computing users have reported fluctuations in the performance of their applications and difficulties during the integration process, these concerns were not reflected in the survey. Start-ups which are currently using cloud computing in their business rated integration and overall performance positively. Each of these aspects received 2.9 points. Service availability was the least problematic aspect for current cloud users, with an average score of 3.0.

For *non-users*, legal issues, in addition to privacy and security, are also seen as a barrier to cloud computing adoption. This factor received an average rating of 2.77, and is the third largest barrier on the list, followed by complicated integration at 2.87, almost in the middle of the scale. High costs and service functionality, with 3.38 and 3.46 points, are relatively insignificant barriers.

Another negative side of cloud computing is that performance of the cloud user's business is dependent upon the provider's performance. However, the respondents

of the survey are quite satisfied with the service availability, as it is at the bottom of the list, with a rating of 3.69. Surprisingly, the least important adoption barrier is service performance (4.07).

4 Conclusion and outlook

In the last few years, cloud computing has moved from a new and interesting paradigm to an established way of utilizing computer infrastructure and software. It has become mainstream in the German speaking IT world, both in academia and in practice. Internet start-ups are the early adopters of this technology because of their tendency to use dynamic business models, their financial constraints and their need for flexibility.

This study has shown that cloud computing is well-known and understood among managers and decision-makers of German start-up companies. Cloud computing solutions have been implemented by a large percentage of the respondents. Infrastructure-as-a-Service public clouds seem to be the most popular deployment option. The business models that are most likely to employ cloud solutions are the content provider model and the service provider model.

Although privacy and security were among the most serious barriers to adopting the cloud computing approach, most of the companies that have already implemented these solutions are comfortable with moving their core business processes and applications to the cloud. Still, the ones that have refrained from implementing cloud computing are not willing to out source these processes in the future. This divide between the two groups offers interesting challenges for information systems researchers. Further research may focus on finding possible solutions to these adoption barriers.

References

- Armbrust, M, Fox, A, Griffith, R, Joseph, AD, Katz, R, Konwinski, A, Lee, G, Patterson, D, Rabkin, A, Stoica, I & Zaharia, M (2010). A View of Cloud Computing. *Communication of the ACM*. 53(4):50-58.
- Deutsche-startups (2010). Startups A-Z. <http://www.deutsche-startups.de/verzeichnisse/startups-a-z>. Retrieved on 27.10.2010.
- Durkee, D (2010). Why Cloud Computing Will Never Be Free. *Communications of the ACM*. 53(5):6269.
- Gründerszene (2010). Datenbank. <http://gruenderszene.de/datenbank/unternehmen>. Retrieved on 07.11.2010.
- IDC (2009). Cloud Computing ist in Deutschland noch nicht angekommen. www.t-systems.de/tsi/servlet/contentblob/t-systems.de/de/873440/blobBinary/09-06_Cloud-Computing-ps.pdf. Retrieved on 12.09.2011.

- Kollmann, M, Häsel, M & Breugst, N (2010). IT-Kompetenz in Internet-Gründerteams. *Wirtschaftsinformatik* 4:201-210.
- Laudon, K & Laudon, J. (2010). *Management Information Systems* 11th Edition. New York: Pearson Prentice Hall.
- Martson, S, Li, Z, Bandyopadhyay, S, Zhang, J & Ghalsasi, A. (2011). Cloud computing - The business perspective. *Decision Support Systems* 51:1.
- Smith, R (2009). Computing in the Cloud. *Research Technology Management* 52(5):65-68.