



White Paper Cloud Computing.

Alternative sourcing strategy
for business ICT.



Systems

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1. Abstract.

The term "Cloud Computing" has been mentioned for just under two years in relation to services or infrastructural resources, which can be contracted over a network. Thus, the idea of renting instead of buying IT is nothing new. And so, Cloud Computing has many antecedents and equally as many attempts to define it. The players in the large world of clouds are Software as a Service providers, outsourcing and hosting providers, network and IT infrastructure providers and, above all, the companies whose names are closely linked with the Internet's commercial boom. But, all these services in combination outline the complete package known as Cloud Computing – depending on the source with the appropriate focus.

That which long ago established itself in the private environment of the Internet is now, noticeably, coming to the attention of businesses too. Not only developers and startups but also large companies with international activities recognize that there is more to Cloud Computing than just marketing hype. Cloud Computing offers the opportunity to access IT resources and services with appreciable convenience and speed. Behind this primarily, is a solution that provides users with services that can be drawn upon on demand and invoiced as and when used. Suppliers of cloud services, in turn, benefit as their IT resources are used more fully and eventually achieve additional economies of scale.

There are substantial arguments for the adoption of Cloud Computing: the lasting improvement of cost structures, faster reaction to changes in the market and potential for increases in productivity. Cloud Computing offers flexibility whilst simultaneously reducing costs – with the positive side effect of sustainability.



**“The data center of the future could be based in the cloud.”
(Jason Staten, Forrester) [Herrmann 2008]**

However, much of Cloud Computing is still a vision. This becomes especially evident if large companies wish to make use of the possibilities. Then, at the latest, questions arise about security and quality of service or, subsequently, whether the proffered services can also effectively meet the company demands of supporting the business processes. Legal aspects such as the storage of data swiftly become more weighted. Professional providers of Cloud Computing for enterprise customers must not only meet these challenges, but also develop concepts in order to do so in a transparent, cost-effective manner.

2. Introduction to Cloud Computing.

2.1. A historical background.

It is conceivable that August 24, 2006 will go down as the birthday of Cloud Computing, as it was on this day that Amazon made the test version of its Elastic Computing Cloud (EC2) public [Business Week 2006]. This offer, providing flexible IT resources (computing capacity), marks a definitive milestone in dynamic business relations between IT users and providers. The target of Amazon's offer were developers, who had no wish to hold their own IT infrastructure, and instead, hired the existing infrastructure from Amazon via Internet.

Nobody at this time spoke of Cloud Computing yet. The term first became popular in 2007, to which the first entry in the English Wikipedia from March 3, 2007 attests, which, again significantly, contained a reference to utility computing. Around this time, Dell attempted to trademark the word mark. This was successful in July, but the permission was revoked only a few days later.

In 2008, there was a glut of active parties in the increasingly popular field of Cloud Computing. Today, Cloud Computing generates over 10.3 million matches on Google. The scope of Cloud Computing grew from simple infrastructure services such as storage and calculation resources to include applications. However, this meant that forerunners such as application service providing and Software as a Service would also henceforth be included under the designation of Cloud Computing.

At the bottom of these developments was the eventual shifting of IT services away from local computers to the Internet or, generally speaking, in networks. Eventually, Cloud Computing realized an idea that had already been hit upon by Sun Microsystems long before the Cloud Computing hype: The network will be the computer.



“Cloud Computing is more an evolution than a revolution.”

Existing technology such as grid computing, utility computing or adaptive computing mark the infrastructure path leading to Cloud Computing; application service providing and Software-as-a-Service signify the growth towards the provision of programmes.

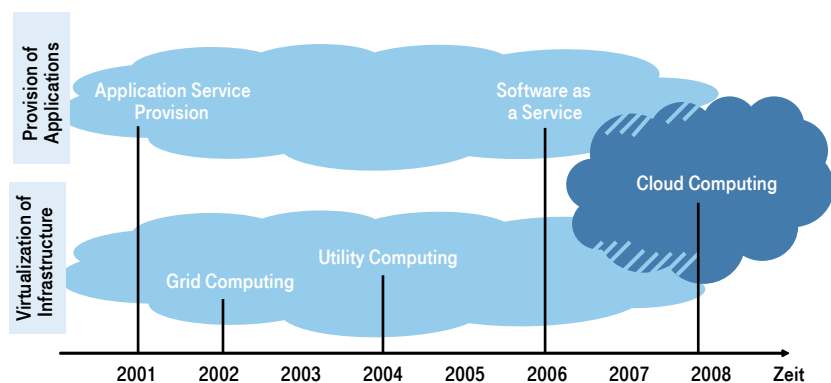


Figure 1: Two trends converge resulting in Cloud Computing.

In present discussions about Cloud Computing, it is often ignored that high-performance networks represent an essential basis of the cloud construct. Consequently, the starting point of Cloud Computing would have to be linked with the development of the Internet. The various accesses to and views of Cloud Computing, and its respective origins led to differing definitions and to its strongly diverging public perception. The significance of the topic, however, became evident, in that not only specialized media were writing about it, but also popular magazines.

2.2. Definitions.

Whoever wishes to find an all-encompassing definition for the term "Cloud Computing" faces an almost impossible task. According to the field of interest, software, service or infrastructure providers highlight different aspects. Hence, at Salesforce.com, the cloud vision brings to mind the well-known paradigm of Software as a Service (SaaS). IBM, on the other hand, is raising itself to the front line of the underlying IT infrastructure with "Blue Cloud". "The cloud takes as its basis a combination of grid computing, where pure processing power is involved, and SaaS", states Dennis Byron, an analyst at market research company Research 2.0, in turn.

Gartner sees a great potential for change accompanying the concept, describing it succinctly as "Provision of scalable IT services via the Internet for a potentially large number of external customers". Its competitor, Forrester Research, interviewed around 30 companies from within the new market segment to develop a definition. According to the results, "Cloud Computing" refers to a "pool of abstract, highly scalable and administrated IT infrastructure, which provides for customer applications and is invoiced based on use." Frank Sempert, too, from the market research and consultancy house Saugatuck Technology refers to this distinction. "While SaaS providers only concentrated on applications, cloud providers bundled together a whole series of components for the customers. These include, amongst others, network, calculation and storage resources and the corresponding agreements with suppliers." The bottom line is that cloud is joining the whole IT world together [Herrmann 2008].

What all of the definitions have in common, is that behind the term "Cloud Computing", the theoretical and still today, abstract concept for the wider market, are IT applications, IT platforms and IT infrastructures on demand, scalable and standardized as services at the disposal of a user over the Internet, in which resources are not physically available from the provider, but applications, calculating and storage capacity from a pool of products – metaphorically known as the "cloud" – are available over the Internet.

According to this basic understanding, we will attempt to give a consolidated definition as a starting point for this white paper. Our focus is not limited to the purely IT aspects, but broadened to include all telecommunications services. Therefore, Cloud Computing is seen as an offer for all ICT requirements.

Our definition:

"We understand Cloud Computing to be the renting of infrastructure and software, as well as bandwidths, under defined service conditions. These components should be able to be adjusted daily to the needs of the customer and offered with the utmost availability and security. Included in Cloud Computing are end-2-end service level agreements (SLAs) and use-dependent service invoices."

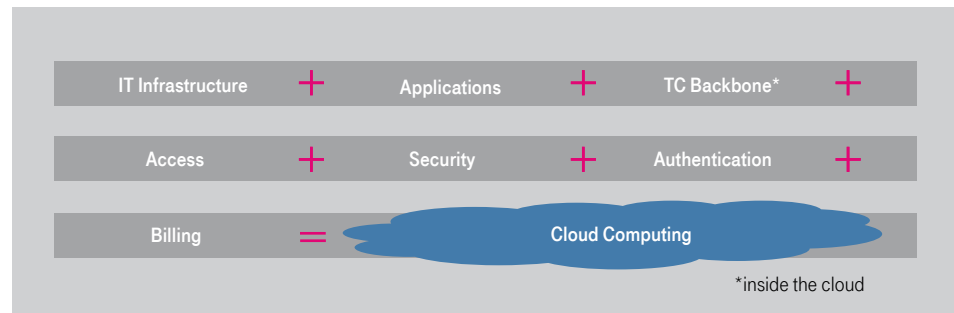


Figure 2: Cloud Computing as it is today.

With Cloud Computing, it is also essential that the customer is supplied with results, not some predetermined components with which to achieve results [Zeitler 2008]. Within Cloud Computing, there are various components (see Figure 2), but these must be offered from a cloud of support services, to be able to describe it as Cloud Computing. These components are as much made up of a predefined and abstracted infrastructure (typical features: provision over the Internet, externally controlled and stored (provider), easily usable over a user interface (web browser), as of dynamic infrastructure software or applications (typical features: easy implementation (with minimal IT knowledge), accessibility by the user personally and in real-time, great scalability (volume, lifespan, etc.) easy integration with other systems (e.g., in-house).

Furthermore, if required, the TC backbone, the guarantee of a simple yet secure access as well as authentication and automated billing should be included in the offered support services. These would ideally be high performance, and securely offered over defined SLAs (typical features: consumption-dependent billing, no long-term contracts). Generally, this is not the case with many offers represented in the market.

For the purposes of the service provider, Cloud Computing will be defined through the 1 to many approach, i.e., that a provider must be in the position to make the proffered services available to a large number of customers. The transport of IT services and resources is also significant to Cloud Computing. Solid broadband networks form the backbone of Cloud Computing. According to customer requirements of security and availability, network providers can make various transport routes available. There will be a rough differentiation between publicly accessible "public clouds" and dedicated "private clouds" reserved for users.

3. Flexible ICT services – more than just a dream.

3.1. Business needs as a driver of Cloud Computing.

According to Gartner, Cloud Computing will transform the market. But why is this happening now, what has motivated companies to focus on the topic of Cloud Computing more intensely now than in recent years?

Firstly, there is the technological component. There is a case for saying that Cloud Computing's time has come because more key technologies – the often cited "enablers" – have now been tested and matured [Herrmann 2008]. However, the actual drivers stem in fact from present-day business needs. In order to remain competitive, businesses must be able to act quickly and assuredly in the markets. Therefore, the needs are to improve the cost structure, react to the market and achieve increases in productivity.

Improving cost structures.

Globally active companies are currently experiencing, as a result of the global competitive situation, a deepening decline in prices alongside rising energy, staff and raw material costs. In addition, financial crises intensify the situation, with market growth falling off or stagnating. Companies are forced as a result, to adjust or even improve their cost structures.

As a rule, adjustment means cost reductions. It is not uncommon for staff reductions or the cutting of business areas in deficit to be the chosen method. However, the conversion of fixed costs to variable costs can make a significant contribution to the long-term improvement of the cost situation – and without resorting to critical socio-economic measures such as staff lay-offs. An improvement of company liquidity is resulting of this conversion. Financial resources that are tied up with particular investments can be used in other ways. Where possible, this is used to convert an insolvency or the freed-up liquidity is used to increase equity and thus, reduce the company's financial risk.

Cost reductions in ICT have a direct effect on the cost structure of the entire company, as a result of high ICT penetration in today's companies. Examples of costs that can be reduced are ICT administration costs or energy costs. However, the quality of the used ICT services must not be impaired by the cost savings.

Other starting points for reducing ICT costs offer on the one hand, the avoidance of idle or empty capacity and on the other, the higher, and therefore better, utilization of the existing ICT infrastructure. Both appear difficult in their infrastructure, which has mostly grown over time. Only a requirements-based, scalable purchase of ICT services with usage-orientated billing can reduce ICT costs significantly - that is the promise of Cloud Computing.

Dealing with changes in the market.

Today's companies must position themselves in increasingly dynamic markets. New products enter into ever shorter cycles in the market. Existing products, but also specialist expertise become outdated faster and a once acquired advancement in knowledge rapidly disappears. This forces the companies to come up with new ideas in ever decreasing time periods.

Moreover, the markets and their participants change ever faster. The way into new markets (for example, through regional expansion to BRIC) and supply chain networks involves a rising number of joint ventures. Along with further reasons, this leads to frequent sales and acquisitions of companies or parts of companies. New companies are created, new business models emerge and occupy new market areas. Along with growth, however, reduction can also be sought after, if demand declines or through strategic decisions to set a new course for a company.

Companies now need to react to these changes, while they want to operate successfully in the market. Thus, the pressure increases not only on the management of a company, but also on its ICT which has to be able to quickly and flexibly adapt to new circumstances in all business processes being supported and mapped by ICT.

Realizing increases in productivity.

As business ICT and business processes are strongly linked these days, ICT can be seen as of critical importance to a company. Fluctuations in quality, such as the availability of ICT services, are directly noticeable. If goods management systems or email systems are not made available, the company processes are clearly delayed and cooperation is no longer possible. Because the time to market is therefore longer, competitiveness decreases.

Hence, more is now demanded from ICT. Not only does it have to be quick and easy, but must facilitate the collaboration aspect – both in direct cooperation (joint work on documents, team meetings with participants from different continents etc.) and structurally (access from any location, preferably no redundant data storage etc.). In rapidly changeable conditions, a difficult undertaking.

All of these business needs require readily available ICT resources and dynamic adaptation to specific circumstances. The stiff, historically developed ICT infrastructures in use today do not offer these possibilities. In addition, only a few companies are able to afford continual investment in the necessary volumes to pay for and always operate the newest technology.

High quality ICT services, however, improve efficiency and effectiveness, reduce costs through a lower susceptibility to faults and improve competitiveness. So, companies have to make special demands of ICT these days. It has to secure market opportunities for the company, but also guarantee security and reliability. ICT and ICT services must therefore display the following characteristics: speed, flexibility, scalability, security, affordability and transparency.

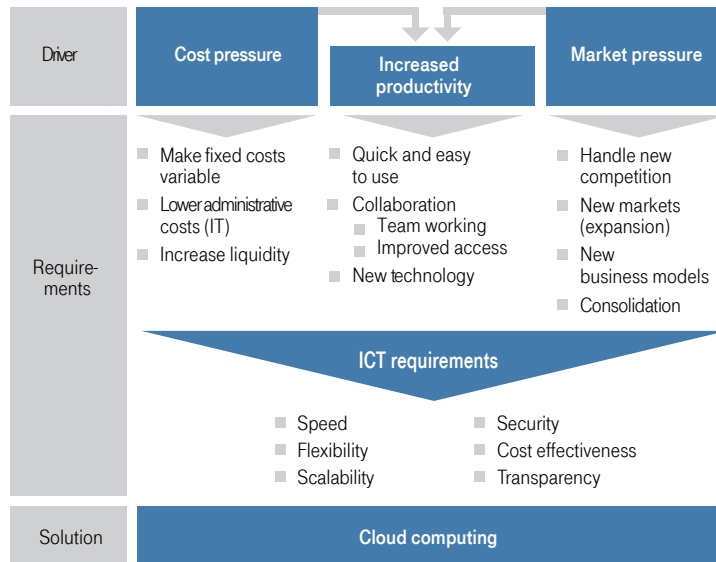


Figure 3: Drivers and requirements of ICT today - from a Cloud Computing perspective.

Speed and flexibility.

Markets that change ever quicker are one of the main challenges that a company has to confront. Companies are successful when they see market opportunities early and react to them quickly. They will drive the issues and shape the market. Therefore in successful companies, organization and business processes are geared towards agility and flexibility.

In many companies it can be observed that the ICT cannot keep up with the pace and agility demanded by business. Instead of optimally supporting the business process with modern information and communications technology, in critical phases, the ICT turns out to be a bottleneck.

A company's processes and production systems are, in many cases, ready for the challenges of tomorrow – but in ICT methods often still prevail, which are at the level of industrialization via processor technology. Often, those responsible for ICT in a company are in a dilemma. The requirements of business of higher quality with decreasing costs appear to be two mutually opposing goals. With inflexible ICT structures, the mobility and dynamism are only possible with extreme limitations.

Successful companies optimize added value with the help of innovative sourcing concepts, by outsourcing parts with which they do not differentiate or in which they are not implicitly competitive. Both cases involve working with a service provider with a command of specialist knowledge and who can achieve economies of scale through specialization. Hence, the challenge is in the creation of open cooperation models. This is exhibited by successful companies, which only rarely work as closed, monolithic systems, but as dynamic, adaptive and networked systems.

Cloud Computing fulfills the demands, which companies place on ICT services, if the quick and flexible provision of resources and services on the one hand, a flexible adjustment of quantity on the other – as much from the top as from the bottom (scalability) – are SLA guaranteed. Services from within the cloud must therefore be designed in a way that they can be flexibly adapted to requirements.

Scalability.

Along with flexibility, which allows companies to quickly and efficiently meet the ICT demands of its business processes, scalability is an essential requirement for modern ICT services – whether or not they are made available through their own ICT department or externally.

Here, scalability means the scaling, equally in horizontal as vertical terms, in dependence on the relevant applications. This should make the (technological) risk borne by the company as small as possible. A front-running ICT infrastructure that is based on extensive scalability requires, especially with vertical scalability, an initial investment in hardware and software, which will not be used and will lie idle. This will only become noticeable in later expansion stages as an increased need for resources. If the market develops differently than expected or the business strategy changes, a worthwhile usage of these resources is often impossible within the period of amortization.

The procurement of performance over a cloud will hand the provision of resources over to a provider. The saved investments can be used in another way (see “Improving cost structures” on p.6).

Security.

As a rule, companies that use or wish to use external ICT resources and ICT services, have concerns over doing so and therefore have high requirements, regarding the security of the company data itself, the thus supported processes. These services must be reliable and available, in order to avoid putting the progression of the business processes at risk.



**Security is one of the core competencies of the cloud provider.
(Jason Staten, Forrester) [Herrmann 2008]**

Today, for many companies, company data is one of the critically important production factors. If data is not readily available, company processes can not operate, or are, at the least, delayed. Against this background, many companies demand special protection for outgoing data – not just with storage, but also with processing and transmission.

Data management must be state of the art. Stored data must be secured against physical and logical errors. Among other things, this also implies the requirements on the installation and operation of data centers. In addition, the location of respective data centers is decisive of the existing data there, through the according local laws (data protection etc.). Data held by a service provider must additionally be transported safely – with suitable encryption, for example.

Secure data storage is, however, only a standard aspect. Only if all areas of an ICT service are on hand, the complete service can be used, from data storage and processing and application through to connecting the company. This means that End-2-End SLAs will need to be agreed. So, for companies of all sizes, the reliability and quality of the appropriate cloud service is key. According to one of the company requirements, data security must also be guaranteed. Additionally, it is not only the fact that the data is safe that is essential, but also how this security is

accomplished and where the data is situated. These kinds of question are an integral part of certification. This question is especially contentious as there are no uniform standards or laws governing the European Union itself in this matter. The relevant local laws apply here.

Costs and transparency.

One of the main reasons to source ICT services from a service provider is to reduce costs. The dynamization of supplier relationships offers companies the chance to only pay for services or resources that are really needed or ordered. This brings about complete transparency over actual consumption and requirement and a billing model, which only accounts for real consumption.

Cost transparency allows customers to distribute internal costs evenly – to services or corporate centers, or perhaps cost centers. The overview gained over the cost situation helps identify cost drivers, if necessary, in order to increase possible savings potential. However, this calls for suitable, detailed monitoring and reporting on the part of the provider. Providers and users benefit from the knowledge of how many resources and services are actually obtained.

Along with the commercial transparency mentioned above that should be offered by ICT services companies, a “technical” transparency is also needed. A precise description of the relevant interfaces allows the procured ICT service to integrate into the ICT and process areas of the company. For this reason, it can be assured that the procured services do not simply come up with an isolated solution, but organically blend into the existing ICT company structures. This is especially required if the procured services have to work with legacy systems.



“The cloud model allows companies to make their IT more cost-effective to buy and to use.” (Frank Gens, IDC) [Prehl 2008]

The requirements are to be assessed differently, however, depending on the type and size of the company in need of ICT services. In particular, start-ups must be distinguished from established companies in the enterprise environment (see also application scenarios in section 4).

3.2. Status Quo.

For the Internet user, the world-encompassing cloud has long been a reality – even if they never realized it. For them, it is largely academic where in the world the server processing their GMX or Google mail is located, where their photos or the Youtube clip that they are watching are stored. That this requires a highly scalable and high-performance and globally distributed infrastructure, only interests them insofar as they find long response times inconvenient [Eriksson 2008].

Companies, however, are rather cautious regarding the use of Cloud Computing. There are many reasons for this: That there is a lack of concrete experience, price/performance models are still not mature and, above all, the desire to wait until the hype dies down are just a few typical reasons [Sohn 2008]. It is possible to conclude from this that the cloud services currently available on the market still have shortfalls for adoption by large-scale companies or have not yet managed to operate a lasting communications policy, which brings Cloud Computing and all of its advantages nearer to the company.

As a matter of fact, many of the current offers of Cloud Computing only partially fulfill the security requirements of enterprise customers. All the solutions have in common that the company is connected via the Internet – mostly as VPN – to the cloud. A direct connection in the form of a point-to-point connection is not possible in most cases.

It is also often unclear where – that is, in which data center – the data is situated and whether it crosses borders. Therefore it is not possible to check whether the relevant data security requirements for the data are being met. In the case of a loss of data, it is often unregulated as to whether someone will be liable for this, and if so, who and what form it would take, as well as whether third parties can access data as a result of locally specific legal practices. However, distributive data management defines the essence of Cloud Computing. As a result of this, cloud proposals have to, in the case of doubt, provide enterprise customers with the common cloud definition *ad absurdum* – through dedicated data management.



Most cloud providers offer no guarantees of availability, service level agreements are the exception in the young market. (Jason Staten, Forrester) [Herrmann 2008]

Alongside these legal uncertainties, most cloud providers do not provide their customers with comprehensive (enterprise) SLAs, as it is standard practice in outsourcing. End-2-end SLAs (covering the complete ICT service, i.e., also with network connection) are a rarity. They are, however, important in enabling companies to objectively assess the quality and reliability of the ICT service.

Along with quality and security, checking the range of services offered in the cloud is also valuable. It will be important for large companies, that the offered services can specifically support their processes – and do this with tested standard applications for the business, not proprietary solutions.

3.3. A summary – added value with Cloud Computing.

The enterprise market hopes to achieve efficiency and cost advantages if it can refer to an Internet-based service, as opposed to operating its ICT itself. And really, Cloud Computing addresses, along with technological added value such as scalability, performance etc., cost reductions and flexibility (as a means of increasing efficiency) above all else.

Cost aspect.

Studies show that large companies can also make significant savings through Cloud Computing. The exact scale of these savings depends on the concrete customer situation. A particularly deciding influence on the cost reductions is the question of how strongly virtualized the resources were before the use of cloud technologies.

With Cloud Computing, the focus is not just on directly achieved cost savings, but rather on the long-term costs, which, through the purchasing of in-house ICT resources, are reflected in the budget. The rental format of cloud computing dispenses with this portion of the costs. This freed-up capital can be used for other concerns and investments. Through the rental model and concerted, continual monitoring of the services, the company receives a high degree of cost transparency; cost planning will thus be significantly simplified. Further cost advantages, which are achievable through traditional outsourcing or outtasking, are likewise applicable here: lower energy costs, rent or investment on property and possible reductions of staff costs.

Flexibility aspect.

Another strong argument for commitment to Cloud Computing is the gained flexibility. Flexibility too, extends in many directions. The initial effect is the stronger alignment of ICT with the requirements of the business. Peaks in demand can be handled through the short-term provision of increased capacity; likewise, ICT capacities can also be leased out over the short term at times when demand is low due to developments in companies, the market or within the economy. The times of oversized ICT supplies for boom periods are therefore over. The next aspect is the speed with which companies can react to their challenges. Reaction times are shortened drastically if ICT resources can be altered within an hour or a day. This provides companies which use Cloud Computing with a much higher degree of agility, for example, in project business, or in organizational changes such as mergers and acquisitions as well as disinvestment.

Flexibility has a third component, which traditional outsourcing providers find difficult. The relationships between providers and users are becoming weaker. Cloud Computing promotes a situational shrinking of business relations at the expense of long-term business partnerships. Cloud Computing ICT users have a considerably wider range of possible providers and, therefore gain tighter control over the ICT. The speed of the formation and dissolution of business relations, as well as freedom to reverse decisions if conditions change, give Cloud Computing an advantage over the initiation and maintenance of traditional outsourcing partnerships. The decision-making freedom is as great as the user allows. With the extent to which this freedom grows, however, companies must also build up their decision-making ability.

A further aspect.

It is Cloud Computing's vision to supply ICT over data networks, as electricity and water are supplied today. Hence, ICT will be demystified. The customers of a cloud provider use "raw" IT and TC resources or a complete service. The technology behind this service becomes insignificant. What counts is the provision of the service and the guarantee of its reliability. That fully-functioning, up-to-date applications are available for business tasks is the quintessential interest of cloud providers.

However, Cloud Computing addresses, above all else, an aspect of sustainability. The usage of well-tailored ICT produces flexibility in a company and conserves natural resources. Energy consumption is reduced and so the environment benefits, not just ICT providers and users. CO₂ emissions fall. Environmentally conscious action can have an effect on evaluations by rating agencies and makes a contribution to a good company image.

4. Areas and examples of application.

Cloud Computing comprises many areas of use. It must be noted that (in particular larger) companies already have a functional ICT landscape at their disposal, as a rule. Cloud Computing must, therefore, seamlessly integrate itself into the existing systems. In the following, possible usage scenarios will be described, which demonstrate the adoption of Cloud Computing in a business environment with and without a pre-existing system, as Cloud Computing can represent an all-encompassing solution, as well as an individual process in the cloud.

4.1 Cloud Computing in business startups.

Startups often possess no ICT infrastructure and also rarely the know-how to implement and operate one. However, it is precisely startups that require reliable and fully functional ICT services within a short time period, in order to implement their business ideas. These must possess the utmost scalability and flexibility in case of unforeseeable growth, in order to be able to meet the demands of the “new” markets. Another reason is that there are ever fewer investors (venture capitalists) prepared to invest in rigid hardware and software to be amortized over several years. A flexible, rentable ICT infrastructure wins particular attention for startups, especially if the company itself is providing ICT services – as is so common in the days of Web 2.0.

The central location in which these companies trade their products or services is their homepage. As they use the cloud server, they avoid having to invest in their own server parks. At the same time, they can use existing security mechanisms from the cloud provider. But also flexible storage and software solutions which can be adjusted to the usage on a daily basis, are of interest for startups. Consequently, a young company can go without reserving ICT resources during the uncertain start phase. If there is a decline in demand, the company is not left to sit on its costs, but can comfortably rent out more of its capacity. The saved capital can be circulated in core activities.

Of course, there are other possible application scenarios for startups. As a rule, companies can initially only access their own applications in the cloud. Classic examples of this are e-mail providers, already familiar in the consumer sphere. These services offer users access to their e-mails from anywhere and at any time. In addition to this, access to software in the cloud (for example, as SaaS solution) is an option for many young companies. Thus, word processing software is freely available on the Internet, license fees and installation expenses are dispensed with entirely. Furthermore, most enterprise software solutions are available for use as cloud applications, here the introduction of standardized CRM solutions is worth mentioning.

4.2 Cloud Computing in companies with existing infrastructure.

In comparison with startup companies, large companies have, in most cases, established ICT departments that hold the specialist and industry knowledge, in order to make desired ICT services available. They often value the security aspects of the ICT higher than flexibility. This is because specialist knowledge and company know-how acquired over a long period of time are contained in its data. This data must constantly be kept safe and available, since it is of critical production value to the company, without which the survival of the company could be at risk. Alongside the cost reductions, companies benefit from the increased transparency of their systems. It is always possible to see what resources are available and which are currently in use. A company with an established ICT infrastructure can also, incidentally, slip into the role of a provider: unused resources can be made available to other companies via the cloud.

Most companies with an established infrastructure prefer a security-orientated course of action with the introduction of new technologies and practices. As there are many reciprocal effects between individual processes and systems in infrastructures which have evolved over time, a step-by-step approach to making the transition is sensible, so that the existing processes are not affected. "Closed" logical units, such as mailing and collaboration platforms are available for the introduction, as are units such as CRM service or desktop virtualization.

A classic example is of a medium-sized consulting firm, which expanded quickly through fast growth and also through purchases – at the expense of a unified ICT landscape. As the majority of employees are only occasionally in the office and mostly deployed on parallel customer projects, it is of critical importance that everyone anywhere and at any time, has all of the information at their disposal. Due to the heterogeneous IT landscape and a multitude of different CRM and BI tools, the distribution of information, on the whole, is anything but optimal. Many consultants skirt around it in order to get information from a quicker channel.

However, it can also be seen that a lot of information gets lost over the passage of time and that quality, therefore, suffers noticeably. Standardizing the ICT systems and the operation of a uniform CRM and BI system would, however, require a considerable initial investment. In times of economic uncertainty, no company wishes to tie up large amounts of capital unnecessarily. One possibility of combating the problem is the introduction of a cloud-based solution. In this case, the software is held on the provider's server. Work colleagues have the opportunity to access the required data from a desktop workstation, as well as on the move, through an internet-capable cell phone, for example. This would mean, on one hand, no high investment, on the other, the quality is noticeably improved through better communication. With a cloud-based solution, problems with the heterogeneous IT landscape can also be overcome, investment costs can be kept down and the transparency of own knowledge can be increased.

4.3 Cloud Computing with critical company applications.

Along with a multitude of "simple" applications or small marginal systems, some companies already obtain business-critical applications from the cloud or produce them in private, secure clouds. Deutsche Telekom currently draws ICT services for some of its business-critical processes from a cloud.

The goal of the decision to use Cloud Computing (in this case for the T-Systems Dynamic Services solution (see also chapter 5) was to set up a need-based accounts receivable management system, which logs invoices and payments as well as managing customer accounts and requests.

Deutsche Telekom's revenue management processes more than 1.5 million payments every day for around 30 million customers. Thus, the DKK (debtors outstanding items) is one of the largest SAP applications in the world.

T-Systems transferred the former server landscape with two mainframes providing around 50,000 SAPs, to a highly standardized "Dynamic Services for SAP" solution with flexible service adjustment. Performance increased by more than 20% – with simultaneous cost reductions of 30%.

The customer can raise or lower ICT resources within a day. To ensure fail safety, a disaster recovery solution in a second data center has been set up at a separate location. The system currently holds 9 terabytes of data.

The reduction in costs is based on manufacturer-independent hardware standardization with clustered commodity components, implementation of backup-integrated storage and work processes standardized to the highest level.



With the demand for use-dependent Dynamic Services, Deutsche Telekom benefits from high flexibility in its IT services.

Measurable – rather technically orientated - added value is expressed in a 45% decrease in server response time, and in a 40% reduction in processing times for batch jobs. Client response times themselves, have fallen almost 10%. Thus, the target of improving the performance of the whole system by 20% has even been surpassed. The dynamic cloud environment turned out to be, in this case, more cost effective and efficient than the classic environment.

5. Dynamic Services – a top-quality cloud computing service.

Dynamic Services are dynamic ICT services from T-Systems, produced in a managed private cloud in secure Twin Core data centers. This cloud is used by many companies simultaneously (shared environment), in which administration and access control are performed entirely by T-Systems. T-Systems supports companies with the choice and configuration of the relevant services.

The basis of Dynamic Services is in dynamic data centers. Here, the required ICT services are produced with the help from virtualization methods and a high degree of automation and standardization. Dynamic Services are built on such infrastructure services generated according to cloud procedures. In order to achieve dynamics on all levels, a virtualization takes place in the application area at the same time. These allow T-Systems to provide customers with applications as a complete service from specialist staff quickly and flexibly.

With this approach, Dynamic Services can be adjusted to the company's special demands. Even after the transition, business processes will be supported smoothly and optimally. Dynamic Services combine the advantages of flexibility and dynamism with adaptability to specific customer needs.

As opposed to most of the cloud packages presently on the market, Dynamic Services offers a Service Level Agreement, corresponding with the current outsourcing standard. It is irrespective whether used as a fully-fledged replacement of previous ICT production or only as an expansion of the existing in-house ICT operations or outsourcing. On request, an appropriate end-2-end SLA will be offered.

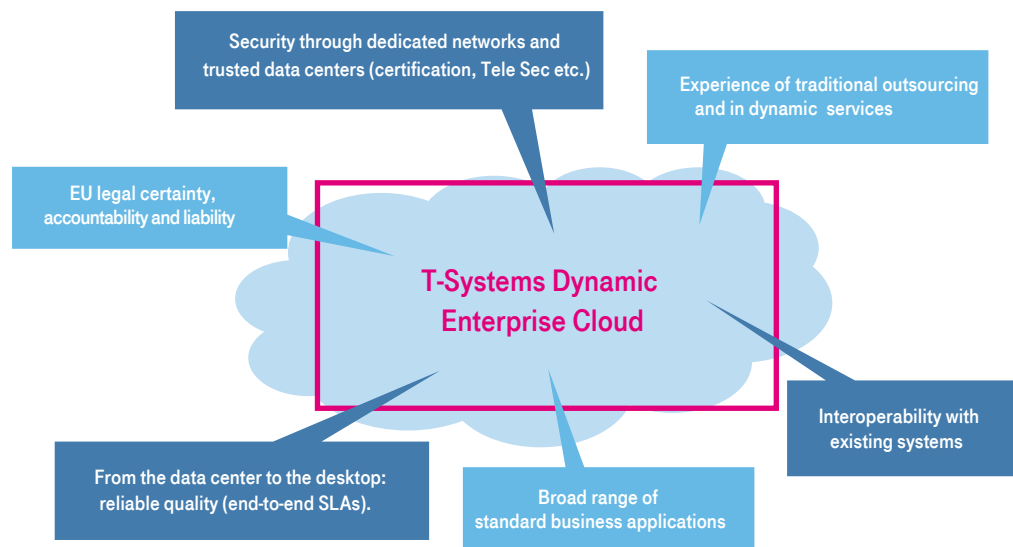


Figure 4: Dynamic Services address all of the requirements of Cloud Computing... and more.

A fusion of Cloud Computing services with established infrastructures requires open, not solely web-based interfaces, so it is possible to directly couple the systems. However, not all systems in use by companies can be transferred into a (standard) cloud. Most of the time these systems have technical restrictions, impose constraints on the hardware components, such as ISDN cards, or require old operating systems or versions thereof. The Dynamic Services offered by T-Systems, however, are capable of combining, not only with other ICT services, but also with “classic” operating systems; from Dynamic Web Application Services, through Dynamic Services for SAP, to Dynamic Desktop, the T-Systems desktop virtualization. The necessary security disjunction takes place with the help of firewalls.

To additionally guarantee the worldwide availability of Dynamic Services, production takes place in many locations around the world, among others, in Germany, the USA, Brazil, Malaysia and Shanghai. The provision of services is carried out using the same procedures and processes in all of these data centers.

6. Summary.

In spite of the intensive focus on private customers thus far, Cloud Computing, with reference to its advantages of flexibility and cost reductions, addresses fundamental IT requirements of industrial companies. But, as before, there are reservations on the part of the users to relocate their ICT onto the network. Reports of system failures at Salesforce.com or with Amazon's storage service, S3, do not make it any easier for the model. Thus it does not matter, that data in the self-operated infrastructure is often more at risk than in the cloud. Acceptance of the concept of Cloud Computing must, therefore, grow further [Bayer 2008].

For this, the providers, above all, must do more – especially as Cloud Computing is recognized by not only IDC as more than just a short-term hot topic: IDC is convinced that cloud services will occupy a fixed place in the ICT sourcing mix of user companies, and are a useful and important addition to the previous ICT sourcing concepts. CIOs in Germany will soon stop posing the question of whether or not cloud services ought to be used, instead, they will ask what the best balance between in-house ICT, outsourcing and cloud services will be for their own company [Kraus 2009].



According to IT visionary Nicholas Carr, the IT resources of the future will only be available online.

Networks – both public and private – take on key importance through Cloud Computing. Their capacity creates the basis for data transport and the availability of services, whose security does the groundwork for the acceptance of Cloud Computing.

Cloud Computing will change the traditional business relations in outsourcing. It will become a trend to set up short-term ad hoc relations. However, Cloud Computing will not manage to entirely eradicate classic one-to-one relations between customer and supplier. It will be effectively hindered by legal provisions and questions of trust. In order for a company to optimally use Cloud Computing, source management and source integration will take on important roles on the side of the user.

Large companies which plan to begin using Cloud Computing should do so together with a partner experienced in classical outsourcing and which can exploit the possibilities of dynamic ICT. Experience in ICT support of business processes is essential: Business processes must be transferred in a way that satisfies the contingent requirements, such as the legal situation, security and quality. It is a plus point if a provider can additionally integrate all network services in a complete package. With Dynamic Services from T-Systems, enterprise customers receive a package that takes all of these requirements into account.

7. Glossary.

1-to-many	One provider serves many customers.
Application Service Provision	Offering an application (e.g., an ERP system) for information exchange over a public network (such as the Internet) or a private data network.
BRIC	Brazil, Russia, India and China.
CIO	Chief Information Officer.
Collaboration	Work involving two or more colleagues or companies.
Customizing	Customer-specific adjustments to a product or service.
CRM	Customer Relationship Management (CRM) describes the procedure and technologies with which the relationship between the customer and supplier can be mapped.
Desktop Services	Customer-specific IT system provision.
End-2-End SLA	Central management of a product or solution-orientated process from beginning to end by a service provider according to predefined service conditions.
ERP	The term "Enterprise Resource Planning" (ERP) denotes the business task of using the resources available in a company (capital, equipment or staff etc.) efficiently for the operational process.
Grid computing	Form of distributed computing in which a "virtual supercomputer" is created from a cluster of loosely coupled computers.
ICT	Information and Communication Technology.
Legacy systems	The term "legacy system" denotes an established, historically developed system.
Joint Venture	Joint Venture refers to a cooperation between companies.
Sustainability	The concept of sustainability involves the use of a renewable system that maintains its own essential features and enabling it and its inventory to continue growing naturally.
Outsourcing	Subcontracting company tasks and structures to a third-party company.
Outtasking	External service providers perform individual tasks, while the contractor maintains process control (personnel responsibility and assets)
Recovery Strategy	Strategy of reconstructing lost data.

SAPS	"SAP Application Performance Standard". This involves an index that specifies the number of order line items per time unit that an SAP system can process.
SaaS	Software as a Service. Here, software is used as a hosted service. It is accessible over the Internet. SaaS can cover IIS or Apache software, collaboration software through to sector-specific applications.
Service Level	Service Level Agreement. This formally agreed document is, as a rule, part of an Agreement ICT service agreement. It quantitatively (or qualitatively) specifies measurement categories, which are regularly calculated for service inspections.
Scalability	Flexible and exact adaptation of a hardware/software solution to customer needs.
TCO	Total Cost of Ownership (TCO) is a cost/calculation procedure and is used to help consumers and companies to estimate all costs incurred from capital goods (software, hardware etc.)
Twin Core	Identical data centers, unreliaint upon, and geographically distant from one another, in which systems and data are mirrored in order to provide stability and as a provision against disasters.
Utility Computing	Technologies and business models, with which a service provider can provide IT services on demand for its customers, billing for usage of these services.
Venture Capital	Risk capital. Private equity, which is provided by an affiliated company for particularly risky activities.
VPN	Virtual Private Network (VPN) denotes a computer network, whose private data – most often encrypted – is transported over a public network (e.g., the Internet).
Web server	A computer, which transmits documents to clients such as web browsers.

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