

Living in the Cloud – Meaning, Myths and Opportunities

Good people are at the core of what we do.



Why does the Laurel Group author publications like these?

The Laurel Group provides guidance and counsel to companies across the nation with senior leadership needs. As advisors and builders of these companies, not only are we experts in talent evaluation and acquisition, we provide guidance around emerging trends that may change the landscape of a given market.

As the pace of change accelerates, the number of clients recently asking us about "cloud services/computing" has been rapidly increasing. However, with all the books, blogs, articles, wikis and other commentary addressing the trend, it has become difficult to discern myth from truth. Our approach has always been to go direct to the source. We felt that the best way to address the questions and inquiries surrounding this market was to bring together a world-class group of thought leaders who are driving this market shift and get their candid input on the meaning of "Cloud Services/Computing", and the challenges and opportunities ahead. What you will read in the following pages are their thoughts regarding the following questions:

1. From your perch, what is the meaning of "Cloud Services/Computing", and what are the most important benefits emerging from cloud services that will transform the economics of IT?

2. How will concerns around data governance, availability and security impact the adoption of cloud services?

3. How are cloud services testing traditional thinking around "control of data" and "guarantees of safety"; to include ownership, access and rights that supersede failure of the provider? Ultimately, who should be accountable; vendor or service provider?

4. What are the SME (Small-Medium Enterprise) benefits that would work well in a departmental setting? What are the key adoption barriers?

5. Is dominance among a few industry giants a good thing for cloud computing? What are the implications for the rest?

About the Laurel Group

We are retained executive search consultants who specialize in working with high growth technology companies, both private and public. We are a firm that strongly believes we must entrench ourselves in the markets we serve in order to provide the best service possible to our clients. As advocates of change and messengers of emerging technology paradigms, we offer these publications as a form of consumable intelligence we hope is both relevant and useful to your business.

We hope you enjoy the read.

Message to our participants:

We would like to sincerely thank each of you for your involvement in this publication, your efforts and candid thoughts are greatly appreciated. We wish you, and your business, continued success in 2009.

All the best,

Steve O'Deegan (editor) Managing Partner, Laurel Group steve@laurel-group.com



IT Lifts Off – Heading for the Cloud

The one thing all of the participants of this piece agreed upon - the future of IT lives in the Cloud. Most acknowledge that the "Cloud" is early in its evolution, but given the low barriers to entry, innovation will be pervasive and will happen quickly. As the industry and technologies mature, there will be increasing adoption across a growing base of customers.

Despite each company coming at the issues from a slightly different perspective, there is a broad mix of highly committed companies who are driving the industry at a rapid pace as the definition of Cloud Computing becomes clearer in people's minds.

Our definition:

Cloud Computing is a multi-tier architecture with the "standard IT stack" components re-arranged into three basic categories:

- Basic Infrastructure mostly hardware and the network
- Platform foundational software and tools to build applications in a standard environment
- **SaaS** the end-user facing Software as a Service that is most commonly understood and recognized by the end-user community (the application layer).

Also important is the ability to dynamically provision these services, and scale them in a very elastic manner, while charging only for the services that are actually used by the customer.

The economic benefits of Cloud Computing were covered in our <u>first publication</u>, but there seems to be a more concise justification emerging which involves more cash flow (which can be re-directed to differentiated activities rather than commodity infrastructure), more focus on core activities, and a faster time to value.

What should live in the Cloud?

There was general agreement that the most significant challenge to broad acceptance of Cloud Computing is the inherent risk in having mission critical systems and sensitive data residing in the (public) cloud. The different approaches to addressing this challenge ranged from recommending private cloud architecture for all core systems, to a separation based on internal/public facing applications, to migrating in a controlled manner from existing hosted hardware/platform combinations.

Ultimately, all responded that the Service Provider should be responsible for security, but also emphasized that it will be imperative for the customer to understand the risks and limitations of the architecture and truly investigate the capabilities of the provider and implications of SLAs in order to make informed decisions regarding the risks and trade-offs. Several respondents mentioned the fact that the whole ecosystem by its nature, is very interdependent, making agreements between suppliers a very important part of the equation as well.



In addition to the above, there was general consensus around three other themes that will be important for all providers as the industry matures: Security and Data Governance; the roles of Large and Small Industry Players; and the rapid trajectory of the Cloud Computing movement.



As with previous waves in the IT industry, both large and small players will help shape the industry by contributing synergistic components. Large players will make the big infrastructure investments and scale to drive a foundation for others to build upon by bringing the most demanding and important customers into the market. Emerging growth players will be innovating from a technology standpoint, exploring new frontiers and filling vertical and technical gaps in the market. Additionally, they will become acquisition targets for larger players who are looking to round out technology portfolios, product lines, customer bases and talent pools. As with any market, competition and natural selection will play a part as the market evolves.

In summary, Cloud Computing has become a driving force in the industry and continues to gain significant momentum. It will be the next important standard in Information Technology with large implications for years to come. In the past six months, we have witnessed unprecedented economic and market upheaval, so it is difficult to forecast anything with certainty. However, barring global force majeure events that derail more than the IT industry, it seems safe to say adoption will move beyond the small and medium business world and into the enterprise within the next few years, potentially changing not only how IT is applied, but determining who leads in the market.

This summary was developed by Steve O'Deegan & Mike Taft, Managing Partners, Laurel Group Silicon Valley, with support from Davis Blair, Principal at Alliancesphere, a strategic alliances consultancy, and Co-Founder of Techaisle, LLC a high tech market research firm and consultancy. A complementary in-depth analysis of this study with supporting user research is available at: www.techaisle.com/cloudwhitepaper.html.

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Werner Vogels

CTO, Amazon

From your perch, what is the meaning of "Cloud Services", and what are the most important benefits emerging from cloud services that will transform the economics of IT?

"I don't think there is a one size fits all answer but I can talk about Amazon Web Services (AWS). AWS provides users with access to IT capabilities that are scalable, highly reliable and very cost-efficient in a manner that can normally only be acquired through deep specialism and experience. AWS is extremely flexible because users can requisition the services on a moment's notice without prior reservations. Finally, there is no up-front investment required to gain access. We are finding that this is allowing new products and business to be created with far less financial risk than previously possible."

How will concerns around data governance, availability and security impact the adoption of cloud services?

"Amazon.com takes security very seriously and follows a 3 tier security model (physical security, operational security, and programmatic security). The physical security deals with the physical location of our data centers. Our data centers are well protected against any type of intrusion. Operational security deals with people who have access to our data center. Only a limited number of Amazon.com employees have access to our data centers and interact with our infrastructure. As for programmatic security, we give you control of your virtual instances at a root level and do not delve into what you do inside them as a matter of policy. AWS provides developers with extensive capabilities to control access and protect their data. From object level access control to firewalls, using these tools enables customers to build applications that can meet various certifications important in a given industry."

How are cloud services testing traditional thinking around "control of data" and "guarantees of safety"; to include ownership, access and rights that supersede failure of the provider?

"Ultimately, who should be accountable; vendor or service provider? In the case of Amazon Web Services ownership and access are straight-forward: the customers under whose credentials the data is stored, is the owner and has all the access and right management controls."

What are the SME benefits that would work well in a departmental setting? What are the key adoption barriers?

"What I hear from many of the businesses that I speak with is that utilizing AWS enables higher reliability and greater scale than they can achieve on their own. The cost is also usually far less because these companies can utilize only what is needed. In many cases the migration into the cloud is straight forward. AWS also has a rapidly growing group of partners to help



https://aws.amazon.com

Amazon Web Services provides Amazon's developer customers with access to *in-the-cloud infrastructure* services based on Amazon's own back-end technology platform, which developers can use to enable virtually any type of business. Examples of the services offered by Amazon Web Services are Amazon Elastic Compute Cloud (Amazon EC2), Amazon Simple Storage Service (Amazon S3), Amazon SimpleDB, Amazon Simple Queue Service (Amazon SQS), Amazon Flexible Payments Service (Amazon FPS), and Amazon Mechanical Turk.

"I don't think there is a one size fits all answer for Cloud Services."

-Werner Vogels



with migration."

Is dominance among a few industry giants a good thing for cloud computing? What are the implications for the rest?

"We always thought that there would multiple companies pursuing this space. It's too good of a value proposition for developers and businesses for there not to be. We have a longstanding policy of not talking about other companies, but generally, it's important to note that we've been at this for two years with a significant team and we've been heads down focused on providing outstanding service to our customers. In fact, we think we are much better at this today than we were three years ago. We've learned a lot about what it takes to operate these services, what kind of features and enhancements customers want, and how these services need to fit together to create an integrated platform. Our customers tell us that they want the flexibility to build their applications the way they want to—they don't want to be locked into a particular programming model, language, or operating system—so flexibility with building applications on our Infrastructure Services is an area where we are going to continue to focus."





From your perch, what is the meaning of "Cloud Services", and what are the most important benefits emerging from cloud services that will transform the economics of IT?

""Cloud Services" is a heavily overloaded term. Current cloud computing offerings can be roughly divided into three "layers"—infrastructure, platform and application—and the transformational impact on IT is a little different at each layer.

Cloud services at the application layer are probably the most familiar, and correspond to the software-as-a-service (SaaS) applications offered by many companies. SaaS adoption is growing very rapidly, particularly among small and medium sized businesses (SMBs), as they are replacing traditional office automation functionality such as mail, and business applications, such as customer relationship management (CRM), with applications delivered via the Internet and compute clouds. The economic impact of SaaS can be significant, because it allows organizations to outsource an entire set of functionality, but therein lies the rub: in many cases you must be willing to make sacrifices in your business processes to conform to those supported by your application provider.

On the other end of the spectrum are infrastructure-oriented cloud services. These give organizations the ability to provision and manage virtual infrastructure via Web interfaces and APIs. The advantage of infrastructure-oriented cloud services is in their flexibility. You can create new virtual machines on the fly, and dispose of them when they're no longer needed. If your application runs on a single Linux server in the data center, it will likely run without too much change on a single Linux virtual machine running in the cloud.

Infrastructure alone, however, cannot fully deliver on the promise of cloud computing. Just because your application runs on a single virtual server in the clouds, does not mean it can scale out across many. More importantly, because the majority of your costs are development, management and software-related operational costs and not the hardware-related costs attacked by cloud infrastructure, an infrastructure-centric approach misses out on the truly transformative economic impact possible through cloud computing.

Platform-oriented cloud services provide the best of both of these worlds, and then some. Platform cloud services abstract the underlying infrastructure and allow organizations to focus on the applications they want to deploy to the cloud, which is, in the end, where the true business value comes from. Applications delivered via cloud platforms can readily scale to meet demand at any given time. And because cloud platforms virtualize the applications and manage the underlying software stack, organizations are able to dramatically drive down the development, deployment and operational and management costs which make up the lion's share of the realworld costs faced by IT organizations."

How will concerns around data governance, availability and security impact the adoption of cloud services?

"In the enterprise these are real issues, but they aren't binary yes or no drivers. In most cases,



www.appistry.com

Appistry simplifies cloud computing for the enterprise, opening the door to a more agile and scalable IT environment. Appistry's cloud application platform addresses the complex challenges of building, deploying and managing a wide variety of applications and services for both public and private clouds. Appistry's products are designed specifically for cloud environments, delivering transparent scalability, application-level fault tolerance, and automated management to new and existing applications. Appistry customers include FedEx, GeoEye, Lockheed Martin and Northrop Grumman.

"Cloud is as big as the move to the Internet was, or bigger."

-Kevin Haar



solutions to these issues are not a pre-condition to progress. We've seen a dramatic shift to organizations building private clouds. While the big broad vision of cloud computing is for everything to be delivered via utility-like services, the fact is enterprises have real constraints around things like privacy and security. We think this will continue to drive the creation and adoption of private cloud environments as enterprises use private cloud implementations as a more thoughtful and controlled path to the full vision of cloud computing."

How are cloud services testing traditional thinking around "control of data" and "guarantees of safety"; to include ownership, access and rights that supersede failure of the provider? Ultimately, who should be accountable; vendor or service provider?

"Organizations are trying to take advantage of cloud platforms-as-a-service as a way to get all the benefits of cloud computing but accelerate the delivery of new applications. The most common way of delivering PaaS is through an integrated bundle of platform and hosting. Lockin, particularly when it comes to data and the ability to migrate data from one environment to another, is a legitimate concern and limitation of a PaaS environment. Cloud application platforms, like Appistry's, allow organizations to get all of the advantages of PaaS –on their own infrastructure or public infrastructure provider that they choose. What's more, they can use traditional databases and data management systems that allow them to easily get their data to and from the cloud.

When it comes to security, many cloud computing providers can provide as good as, or better security than what some enterprise are able to provide on their own. But there are much broader issues than security. Cloud computing still presents some limitations when it comes to guarantees of privacy and access by third-party entities. We think this limitation is further validation of the private cloud market. Enterprises can mitigate their risk while still reaping the benefit of a cloud environment."

What are the SME benefits that would work well in a departmental setting? What are the key adoption barriers?

"SMEs are primarily focused on the application layer of the cloud computing stack. SaaS offerings give SMEs easy access to applications that don't require teams of IT support. Therefore, they benefit from cloud computing in several major ways.

First and most importantly, SMEs turning to cloud applications can avoid owning and managing infrastructure for a broader assortment of applications. In addition, cloud computing is all about pay for what you use and substantially lowers the pain and cost of adopting new technologies. There are clearly some adoption barriers, but in our experience, we have seen the benefits far outweigh the barriers especially when compared with building and managing and maintaining infrastructure as a small to medium size enterprise.

We also see a trend emerging for this market: Cloud computing will eventually make it easier for SMEs to build custom capabilities that enhance their ability to compete. Cloud computing offers a path to a much simpler world of software enablement where more "software services" will be available in the cloud and SMEs will have the ability to build or leverage these services in a much more comprehensive and unique way. Salesforce.com is a great example of this, allowing



SMEs to quickly develop simple applications using just a Web browser."

Is dominance among a few industry giants a good thing for cloud computing? What are the implications for the rest?

"Cloud computing is just getting started and although there have been a number of major players that have jumped into the fray, the reality is that we're still in the early stages of the evolution of this market.

Cloud is as big as the move to the Internet was, or bigger. Assuming that these large companies will dominate is akin to the assumption that Microsoft or IBM would control all things Internet. They have certainly benefited from the transition, but in the process new industry leaders have been created, including Google.

The possibilities around cloud computing are more likely to be pioneered by start-ups and new entrants to the market. This is especially true since cloud marks the first major disruption in the approach to application offerings, software infrastructure and hardware infrastructure in a very long time.

The industry is experiencing a sea change in how it thinks of computing. At the end of the day, cloud computing represents tremendous opportunity for new entrants."





What is the meaning of Cloud Services from your perch, and what are the most important benefits emerging from Cloud Services that will transform the economics of IT ?

"The promise of cloud computing is becoming less and less 'nebulous' as the technology continues to address the two main challenges facing IT today -- cutting costs and supporting innovation, issues that are often at odds with each other.

While there is no doubt that there is a lot of hype around the benefits of cloud computing, in this case, you can believe the hype. Why? Because the technology delivers what every IT department needs -- increased capacity and capabilities, without investing in new infrastructure, personnel, or software.

Still, every organization must carefully determine which services should be in the cloud. For example, while the US Defense Department may benefit from having its recruiting enrollment system in the cloud, they wouldn't want their missile guidance system in the cloud.

While cloud computing may be appropriate for some components, it's important to preserve the underlying end-to-end business processes. As a result, the benefits will not be achieved through stand-alone solutions, but will only be realized through seamless integration and interoperability."

How will concerns around data governance, availability, and security impact the adoption of Cloud Services?

"Governance, availability, and security combine to determine whether a service should be in the cloud or not. Requirements differ for each organization and for each type of data, and will impact adoption until the requisite technologies and solutions are mature enough to push into the cloud.

With a 911 system, for example, availability is all-important; governance and security are not. An SEC filing system, on the other hand, has extreme governance and security requirements, while availability is not as critical. As a result, Fortune 500 companies -- who must abide by strict governance and security requirements -- may take longer to adopt cloud services. To move into the mainstream, vendors and service providers have to tackle these issues now.

We've made a lot of progress in security; many people feel comfortable shopping online, banking online, or, to a lesser extent, accessing personal medical records online. Governance however, is another issue altogether. Internationally, Fortune 500 companies may want to put a service in the cloud, but in some cases, won't be allowed to do so. Europe, for example, has stringent laws regarding the movement of employee data across borders. These concerns will cause certain solutions for certain organizations to remain on premise until the services mature. Once these



www.castiron.com

Founded in 2001, Cast Iron Systems is The #1 SaaS Integration Company™. The company provides the simplest and most widely used integration solutions for integrating SaaS applications with the enterprise in days. The Cast Iron solution also enables SaaS providers to offer rapid integration to their customers.

"Consolidation is essential for cloud services to become truly mainstream."

-Ken Comée



issues are resolved, then the sky is the limit (so to speak).

Still, there are some services that will forever remain on premise. Again, a case in point is nuclear power plant monitoring -- while it's technically possible to put it in the cloud, should we? At least for the foreseeable future, we can acknowledge that some services, for security reasons, won't go in the cloud. In other words, we shouldn't let the enthusiasm surrounding cloud services obscure our better judgment."

How are Cloud Services testing traditional thinking around control of data and guarantees of safety to include ownership, access, and rights that supersede failure of the provider? Ultimately, who should be accountable: vendor or service provider?

"Accountability is a loaded gun. The current state of the industry is that no one is responsible. Neither vendor nor service provider wants to assume responsibility. In fact, there's no track record on which to base Service Level Agreements, so no one offers a service agreement with a 100% guarantee. The most trusted and reliable of services can and do fail from time to time.

Although currently service providers offer no guarantee, they should. Accountability has to lie with the service provider because their services utilize multiple vendors, applications, and technologies. But they're not going to accept this responsibility until there's maturity, and then they'll charge a premium for it. This is a real-world problem that we see every day. It is one of the reasons customers want flexibility. They realize that there are services that can be in the cloud and others that should remain on premise, but they need the interaction between them to be seamless, so again integration is critical.

The bottom line is that with the risk and the onus on the customer, it is the responsibility of every organization to determine which services belong in the cloud and which do not. So for now, my advice is: when in doubt, don't put it in the cloud."

What are the SME benefits that would work well in a departmental setting? What are the key adoption barriers?

"The benefits of cloud services -- fast deployment, lower costs, less IT burden -- are the same for departments in the enterprise as for SMEs, but the barriers are different. What works well for small companies often takes a little longer for big companies due to legal and regulatory constraints. Cloud services can be beneficial, but large organizations can't always immediately take advantage of the benefits due to governance and security requirements. A Fortune 500 company is not going to just switch on a cloud service for 50,000 people overnight, rather department after department will start using these services, which is how we're seeing them being adopted."



Is dominance among a few industry giants a good thing for cloud computing? What are the implications for the rest?

"Consolidation is essential for cloud services to become truly mainstream. This happens in every new market. Innovators invent, develop and prove that there's a market -- that there's money to be made -- and then the industry giants complete it by building on the groundwork of the innovators.

Consolidation is good if it starts to resolve the issues that will otherwise delay the adoption of full-on cloud-based services. The big players put the resources into standards, security and governance -- areas in which the strengths of these companies have already been demonstrated. For example, storage moved to the cloud very quickly. As larger players entered this arena, they brought with them the expertise to resolve the security concerns. Who wins at the end of the day? The customer wins.

Without the power and influence of industry leaders, you can't change the economic landscape of IT-- especially in a fragmented market. And while some start-ups will be acquired, innovators will continue to push the boundaries. Other start-ups will become industry giants themselves like Amazon and Salesforce.com, while established giants like Cisco will reinvent themselves to continue to lead the market.

So while the concept of cloud services has already captured the industry's imagination, consolidation will help the technology achieve mainstream adoption."



David Bernstein

VP/GM, Office of the CTO, Cloud Computing Project, Cisco

From your perch, what is the meaning of "Cloud Services", and what are the most important benefits emerging from cloud services that will transform the economics of IT?

"Cloud Computing, as we prefer to call it, is nothing short of the emergence of a new kind of computer. We've seen the development of the personal computer change drastically over time, and it continues to change, into a mobility-capable device somewhere between a smart phone and a laptop. We've seen the server mature into a pretty standard, affordable, shareable unit of computing and storage. Now we see the emergence of the Cloud Computer.

The Cloud Computer can look like lots of servers, if that's what you want to see. This is Phase 1 of Cloud Computing. The economic impact of this capability is calculable by considering the trade-off of CAPEX for OPEX in the usage model, and the efficiencies that density and automation give you in energy, resource, and space utilization. Those are quite transformative and will power and solidify the adoption of the Cloud Computing model. We see this as a linear continuation of the increasing cost effectiveness of computing infrastructure driven by the various laws of improvement rates in networks, computing, and storage. This is huge but it is not new.

But look harder, the way Microsoft, Google, Amazon and some of the social sites are, and you'll see that the Cloud Computer runs a different kind of software. It supports a paradigm which has more communication, more data, more connections, more media, more insight, more people and more things than server software can ever have. This software does not run on a server. That is Phase 2 of Cloud Computing. This new generation of software, enabled by Phase 2 Cloud Computing, will have as much an impact on IT as client/server did or as the Internet / Intranet did. Employees will be able to search in their company as fast as they can search on the Internet today. Globalization will be enabled much more easily as the IT infrastructure is naturally distributed. Communications will be streaming media enabled and the Cloud will intermediate mix and match endpoint capability amongst vast numbers of people. The next generation of the workforce, who grew up never knowing life before the Internet, will use Cloud Computing to power their norms of multitasking, constant interruption, expectations of immediacy, velocity over precision, and constant connectivity expectations. Cloud Computing will serve the next generation of IT customers.

By then, IT will no longer have to create specialized physical or low level system software to support a diversity of applications; applications will run on the standardized Cloud Computer and IT will concentrate more on strategy and results. This shift will not take the pressure off of IT, however. Scale and velocity constraints are largely lifted by Cloud Computing; now speed of development and execution will finally be directly tied to competitive success. The IT job will be to work with the business units to leverage this new computing model, at a logical and results level, not at an infrastructure and provisioning level. IT will change from an allocations based funding model to a partner in the business. That will indeed be a huge transformation in the economics of IT."



www.cisco.com

About Cisco Systems: Cisco, (NASDAQ: CSCO), is the worldwide leader in networking that transforms how people connect, communicate and collaborate.

"Cloud Computing, as we like to call it, is nothing short of the emergence of a new kind of computer."

-David Bernstein



How will concerns around data governance, availability and security impact the adoption of cloud services?

"In software which runs on servers in the past two generations of Client / Server and Web style, assumptions were made about governance, availability, and security. When you move these into the Phase 1 of Cloud Computing, you break these assumptions. Data is no longer where you thought it would be. Processes which were transparent may now be completely opaque. Resilience and Continuous Operation strategies don't translate to the new infrastructure, certainly not at the same cost model. So these concerns are real. If one goes into this with eyes open, many of these issues can be addressed. Cloud Computing vendors offering network-based encryption for all data at rest are emerging, as are ones who will use network-based domain isolation while still in the shared infrastructure. Secure connections from the enterprise to the Cloud can be implemented. Cloud-appropriate Continuous Operation technologies can be substituted for the server-based ones. And transparency, auditing, and logging facilities are becoming available either in selected Cloud Computing platforms or as third party add-ons.

These challenges are analogous to the challenges faced by application developers when asked to switch from thick client, highly interactive software based on dedicated servers, to a web browser and shared web server platforms. Those who tried to move the same look and feel right into the browser failed. The network, transactional, and session model of an Internet web application is different from the LAN Database model. Software had to change for this platform shift. The Cloud Computing Model is no different.

In the Cloud, one adopts an availability strategy which assumes regular failures in the Cloud. Data is automatically replicated, not only to multiple systems but to multiple actual locations. Aggregate network utilization is assumed to vary widely and so both Cloud-level and Application level congestion management is utilized. Applications are designed to ask the Cloud to shift up and shift down various resources and capabilities to account for variability. For example, in a multi-way video collaboration application, different endpoints will shift up and down in video resolution based on the availability of resources in the Cloud and the Network. In Cloud Computing, deployment and provisioning is the job of the Cloud, not the system administrator. And things change mid-stream. Therefore, the Cloud infrastructure, from the Network to Storage to Computing, to the System Software, will provide instrumentation and transparency which was never needed before, such as the ability to ask the question, "where are all the parts of this application running?".

The analogous concern used to be, how can my Web application scale beyond how I've gotten my huge database application to get to. Well, load balancers and application server based Web architecture more than addressed application scalability, well beyond the database architecture. The mature infrastructure and the software written for Phase 2 of Cloud Computing will have addressed data governance, availability and security concerns beyond what we have been able to accomplish today."

How are cloud services testing traditional thinking around "control of data" and "guarantees of safety"; to include ownership, access and rights that supersede failure of the provider? Ultimately, who should be accountable; vendor or service provider?

"In our view, there is little new here. Consumers of public network services - like, everyone who



uses networks - knows that contractual guarantees are no substitute for contingency planning. Utilities of any kind have faced this issue for years. They provide as much transparency as they can, and the rest is statistical. Have a mission critical application which can't stand a single power failure? Get an emergency power solution. Have a situation where you can't tolerate Cloud downtime? Architect your application to spread across multiple clouds. Need to know exactly where your data is? Hire a Cloud provider who will tell you. We believe that smart system design and vendor selection are key to not having surprises down the road. Any customer of any IT service who expects to take no responsibility for the overall integrity of their situation is not thinking clearly. On the other hand, bast practice in network and datacenter construction already includes these concepts. Clouds are utilities, you just have to think of them that way, and be a "smart user"."

What are the SME benefits that would work well in a departmental setting? What are the key adoption barriers?

"Cloud Computing is a terrific enabler for the small and medium business. We've all seen what Software as a Service has done for the SME segment. Cloud Computing is the ultimate SaaS platform, and we expect an explosion in SaaS innovation as Clouds become more and more capable and pervasive.

As clouds begin to include new capabilities, SME will be the first benefactor of SaaS applications using these new features. For example, lets envision what will happen when Cloud Computing supports streaming media capabilities, including many of the varieties of technologies for voice and video such as multipoint conferencing, network based line speed transcoding, location based services, and so on. SME companies who needed to buy special infrastructure for media based applications such as digital signage, video surveillance, video conferencing, and so on, will now be able to take advantage of SaaS applications and services, who have implemented those capabilities on Clouds.

Additionally, Infrastructure as a Service and Platform as a Service, or IaaS and PaaS respectively, will become available to the SME company. These are cloud based "raw" computing/storage, and programming/mashup services, that would normally be too complicated or too expensive for the SME company to use. Cloud access to these will allow SME companies essentially limitless computing, storage, databases, application server, mashup tools, and other "horizontal" capabilities which they might never have been able to utilize if they needed to purchase and operate their own datacenters.

These translate right into the department of the large enterprise. While we don't envision an enterprise installing their own Cloud-based video surveillance system, we see them using video and voice based applications in a department setting, just the way that sales and marketing automation solutions like CRM, aimed at SME companies, were used just as often by departments in large enterprises.

For software to really proliferate at the SME segment, standard Cloud platforms have to exist. Just like SQL sparked the fire for the departmental and SME database applications, standard ways to write applications for Phase 2 of Cloud Computing which run on many vendors' Clouds will need to emerge."



Is dominance among a few industry giants a good thing for cloud computing? What are the implications for the rest?

"The dynamics of the Cloud Computing vendor landscape will be no different than the previous phases of computing. Building and running planet size infrastructures is an expensive proposition which only the larger IT companies can afford to venture into. Likewise building the equipment and software out of which you build a cloud requires significant R&D expertise and expense. This is no different from the investment level required to build a microprocessor for example. There is, and there will always be, plenty of room for innovation all around, on top of, and underneath what these vendors produce.

Let us also realize that Cloud Computing is brand new. There are so many fundamental innovations still to be pioneered to make Phase 1 of Cloud Computing a pervasive, interoperable reality. Many of the key elements to build a Phase 2 of Cloud Computing, have yet to emerge on the open market. Add to this the wide open opportunity around the programming model, and the stage has been set for innovation in large companies and in start-ups alike.

Large and small companies have been scrambling to enter this market, in a way reminiscent of the early days of similar paradigm shifts such as IP networking, departmental servers, and Web application servers and programming languages. Companies large and small, who understand that this is a 4th wave of computing infrastructure, and not just a new kind of server, will do well. The key we have realized is that Cloud Computing amplifies the need to intimately relate networking, storage, computing, and software into a holistic, virtualized, automated system. The existing model of applications infrastructure allows the model of a physically separate view of these parts, which then runs on physically separated infrastructure. In Phase 1 of Cloud Computing, one can still support the application model of a physically separate view of these parts, but the actual physical infrastructure is hidden beneath a layer of automation and virtualization, This requires complete flexibility amongst the parts. In Phase 2 of Cloud Computing, the application model of a physically separate view of these parts disappears, the software is completely abstracted from the physical. Our company for example, are now making infrastructure, which can be used in this way, that is completely virtualized, with intimately related networking, storage, computing, and software. This kind of realization, and this kind of technology investment, is exactly what we think customers will need. It will enable cost effective construction of Cloud Computing, further accelerating this trend.

It's a great time to be a part of this!"





From your perch, what is the meaning of "Cloud Services", and what are the most important benefits emerging from cloud services that will transform the economics of IT?

"The IT industry is maturing. Today every company has an IT staff who keep apps, servers, desktops running. In the early days of autos, every company probably had a bunch of mechanics for their fleet. Now it's outsourced. In IT we're beginning to see the same trend: Service providers with specialized knowledge of IT needs (perhaps just IT guys with a passion for business) figure out how to offer IT functions as services, delivered to enterprise customers over the Internet. Scale, automation and a built-in need to surface metrics to allow costs and therefore prices to be calculated, provide all the incentives to drive toward a more efficient, highly replicated, massively scaled architecture. It's more agile, a lot cheaper. It has a long way to go. But it's an IT infrastructure cloud. Soon, enterprise CIOs begin to demand "cloud like" capabilities and price points from their vendors – who respond with consumption based pricing, new resource scheduling and consumption models, cheaper ways to deliver key capabilities such as business continuity, DR and desktop delivery. Suddenly IT finds itself exposing internally visible, automated "self service" management interfaces for lights-out IT resources, and realizes it has built an internal cloud..."

How will concerns around data governance, availability and security impact the adoption of cloud services?

"Very significantly. Having brokered numerous conversations between federal would-be cloud users and major 3rd party clouds, I have witnessed first hand the key reasons why clouds will remain appropriate for non mission-critical workloads and workloads that are not subject to security or regulatory oversight. The Web/App server tier, but not the mission critical data. There is no enterprise that I am aware of that has decided to trust its mission critical information to a major third party cloud. There are, however numerous enterprises that have adopted the co-lo model where the provider offers "servers, pipes, cages and storage", and under the auspices of renting a "whole machine in a cage" the enterprise takes the big next step to trust the provider with its mission critical data. I am confident that in 2009, the "Cloud as DR provider" will emerge as a very economically attractive option for mid market customers. Also we will see larger adoption of 3rd party clouds for stateless workloads."

How are cloud services testing traditional thinking around "control of data" and "guarantees of safety"; to include ownership, access and rights that supersede failure of the provider? Ultimately, who should be accountable; vendor or service provider?

"Accountability is a murky area – the more so when money paid by a customer to a service provider is involved. I believe that by exposing the raw units of provisioning (VM CPU/memory per hour, storage per GB, concurrent users perhaps), the provider clearly defines the boundary of



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Citrix Systems, Inc. is the global leader and the most trusted name in application delivery infrastructure. More than 215,000 organizations worldwide rely on Citrix to deliver any application to users anywhere with the best performance, highest security and lowest cost.

"Clouds are not interoperable today and customers are scared of walking down a one way street."

-Simon Crosby



their intentional management of and responsibility for the app/user boundary and IT admin/ offered resource management. If the provider sells VM hours, and an attack on an application specific workload in a VM occurs, how can the provider be held responsible? This is by no means clear though, in the legal world, and I would caution any user to very clearly identify responsibility and onus in their cloud based world. My recommendation is to start simply: You operate your own "cloud" today: what requirements do you place on your IT team who deliver resources to lines of business? What additional assurances do you need in the form of SLAs for your workloads if they are moved beyond enterprise boundaries? You'll pretty quickly realize which workloads are mission critical or subject to regulatory or other controls. Those are not candidates for today's public clouds. You can however achieve many of the advantages of cloud costs and scale, by adopting a different way of thinking about how to provision resources, how to interconnect data centers, and how to service users. This way is essentially to mirror the highly automated, scaled out architectures of the cloud providers with built in metrics that permit accountability by user/line of business, per resource. This alone turns IT into a responsive, metered, automated and service-oriented function - a key step in which IT departments deliver internal cloud services rather than 3rd party service providers."

What are the SME (i.e. Small, Medium, Enterprise) benefits that would work well in a departmental setting? What are the key adoption barriers?

"The adoption barriers in the near term are all safety, manageability and control related. In today's climate, can you be sure that your cloud vendor will still be running in a year? Even if you adopt cloud services, how can you be protected from consolidation in the business arena, and are you vulnerable to a fast-changing technology faddism that repeatedly surfaces in tech? The mid market stands to benefit significantly from clouds because it is typically stretched from an IT admin expertise perspective, and SMEs typically have grown their businesses somewhat haphazardly without attention to developing a highly automated and efficient IT infrastructure. Key functions such as disaster recovery, automated backup and CDP will be the initial hits, followed by "cloud bursting" in which stateless web/app front ends and test/dev server needs move to rented service provider based resources. A key segment of "cloud" provider in this category will be the Managed Service Provider (MSP) who today offers trusted IT consultancy/ support/resale services to SME. These folks will make clouds ultimately viable by offering hosted enterprise IT as a service "just around the corner, and run by I guy I trust"."

Is dominance among a few industry giants a good thing for cloud computing? What are the implications for the rest?

"Dominance is a state of public perception. Does Amazon EC2 make any money, or is it simply paying some of the bills for servers that aren't currently being used by Amazon's primary online sales business? Probably it is making money, but not a lot. Moreover, the cloud era is just beginning and the concept of an industry giant is somewhat misleading. Ultimately, the adoption of a service-based, 3rd party IT resource will succeed only on the basis of sufficient customer trust (requiring security, accountability etc on the part of the provider) and on the valueadded services offered. In the initial phase, a key value-add is the human interaction between a customer and a reseller-turned-service-provider in the form of a MSP. Once customers are happy with MSPs that they trust and who offer superb personalized service with the right assurances, they may move to adopting impersonal entirely automated, pay –by-card services



such as EC2. If they do, it will be based solely on customers' perceived risk, the provider's perceived security/reliability and contractual commitments to that effect. However customers will also be leery of becoming trapped by their cloud providers, and stuck with an inability to move key apps/resources when needed. Clouds are not interoperable today and customers are scared of walking down a one way street. Big brands (HP, Microsoft, IBM etc) may help, and they may hinder. Ultimately customers will settle with a service provider that meets their business objectives and specific needs. Starting small with key workloads, and leveraging the public clouds only for non-mission critical, stateless web/app server and compute intensive simulation applications."



John Keagy CEO & Co-Founder GoGrid / ServePath LLC

From your perch, what is the meaning of "Cloud Services", and what are the most important benefits emerging from cloud services that will transform the economics of IT?

"Cloud Computing is all manner of Internet infrastructure delivered by a service provider in the Cloud. Another way of considering it, is that everything in the datacenter is now available from the 'cloudcenter' with strong benefits in IT flexibility, cost and capabilities.

The economies enabled by cloudservices are fantastically compelling. As much a 95% of a typical 'dedicated' infrastructure sits unused. This means that a 20X improvement can be had in the cost/value computing equation. Cloud Computing delivers on that and more. Service delivery from the 'Cloud' enables providers to profit from putting customers onto shared platforms while at the same time passing great savings/value to the cloud customers. Other customer benefits include ease of use, tighter security, greater reliability, lower risk, human support, and scaling capacity when a success event drives demand surges.

In short, Cloud Computing is more profitable for the service provider, while delivering 20X improvements in the economics of IT and accessibility of the latest technologies."

How will concerns around data governance, availability and security impact the adoption of cloud services?

"The ease of implementation coupled with on-demand pricing of Cloud Computing enables enterprises to take baby steps in transitioning to the cloud. This makes adoption faster, easier and lower risk than previous new waves of server technology and overcomes our natural tendency to resist change and raise objections.

The concept of 'shared datacenters' is not new; it was previously pioneered by the likes of EDS or IBM. Despite this, shared platforms may still sound risky; done right, they can be built and administered with security, scaling reliability and capabilities that few individual enterprises would have the resources and the skills to accomplish. The resources that the Cloud Computing provider pools, enables more and better trained technicians for more hours with better equipment, tools and backups.

We are confident that required compliance for financial and other 'high risk' applications will soon be easier for the middle market to achieve 'in the cloud' than on their own. We are likely to see mandates for enterprises to engage in Cloud Computing in order to be achieve best practices, including best security.

Right now, some Cloud Computing providers are offering 'hybrid' solutions that enable specialized secure databases in dedicated environments that cross-connect to a flexible cloud environment."



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GoGrid offers Windows and Linux cloud servers preconfigured with familiar images. You can deploy a full LAMP stack or Microsoft SQL Server in minutes. You can deploy a full LAMP stack in minutes (or see if PHP really does run faster on Windows). You can create and manage complex server networks in just minutes - f5 load balancing included free. Run complex databases on custom servers connected to efficient cloud servers. Simplify with Cloud Storage. And do all of this from your browser. GoGrid was the winner of LinuxWorld 2008 Best Of Show and is the official Cloud Hosting Provider of Windows Server 2008 and SQL Server.

"We estimate that less than 1% of the Internet infrastructure that is a candidate to be put into the 'cloud' is actually in the cloud."

-John Keagy



How are cloud services testing traditional thinking around "control of data" and "guarantees of safety"; to include ownership, access and rights that supersede failure of the provider? Ultimately, who should be accountable; vendor or service provider?

"By definition, tradition and common sense, service providers do not and should not own the data on the servers delivered to their customers. In fact, right now most service providers deliver greater data center robustness than most companies can achieve on their own. Furthermore, service providers enable their customers to architect significant geographical diversity into their data repositories and backups."

What are the SME benefits that would work well in a departmental setting? What are the key adoption barriers?

"Department size groups that need server networks frequently encounter procurement delays and other overhead when working through their IT departments. Cloud Computing is available 'and disposable' instantly in multiple standard and optimized configurations, and with good capability for scaling 'up and down'. Cloud Computing is easy to explore. Most vendors offer self-help systems and some give away free trial periods. Cloud Computing is right now perfect for development, testing, temporary needs and public facing applications."

Is dominance among a few industry giants a good thing for cloud computing? What are the implications for the rest?

"Yes, we need strong, highly credible giants to lead the industry. We estimate that less than 1% of the Internet infrastructure that is a candidate to be put into the 'cloud' is actually in the cloud. There is plenty of business to be had by all and the most important thing for the growth of Cloud Computing is credibility. That being said, we will see the smaller players be more nimble, innovative and perhaps niche oriented than the giants. As yet we do not believe that there are dominant incumbents in Cloud Computing. Some of the giants are close, but they exemplify closed standards in cloud computing architecture. To build and then to maintain leadership, all cloud service providers will need to embrace open standards."





From your perch, what is the meaning of "Cloud Services", and what are the most important benefits emerging from cloud services that will transform the economics of IT?

""Cloud Services" relate to a broad range of computing services delivered simplified way, providing massive scalability and differentiated quality of service to foster rapid innovation and decision making. Cloud services may range from elemental or transactional services to more elaborate services involving human interaction. Services must be flexible, separating the concerns between those who use the services and those who provide them, while supporting optimization strategies to achieve economies of scale. Typically, such services are thought to fall into three main categories: infrastructure, platform, and software, "as a service." Infrastructure as a service relates to providing the basic elements of computing, such as servers, storage, networking, and operating systems, enabling users to construct computing environments without building the infrastructure themselves. Platform services add to the infrastructure a richer software environment with a variety of built-in capabilities and tools such as database, transaction management, and development tools. Software as a service provides applications and business processes, such as customer relationship management or enterprise resource management. Cloud computing results from the trend to industrialize the delivery of IT services with far more repeatable and reusable elements. It builds upon Service Oriented Architecture, Virtualization, and Standardization, and requires a dynamic infrastructure with rich service management to successfully deliver upon its promise.

The benefits of Cloud Services and Cloud Computing environments are many, but are rooted in flexibility, scale, reduced time to value, and variable costs that match business needs dynamically instead of via fixed capital and operational expenditures. In a world where almost anyone and anything can connect to the internet, the exponential increase in the volume of information and connected devices creates a dilemma: IT complexity increases as does the demand for simplicity. Organizations are facing accelerating business change, global and domestic competitive pressure, and social responsibility demands, requiring a reduced IT barrier to innovation. The underlying technologies associated with cloud computing are part of an innovative computing approach focusing on the creation of a more dynamic enterprise, as applications and the services they support are no longer locked to a fixed, underlying infrastructure and can adjust quickly to change. Cloud computing can have a huge impact on a company's financial performance. It can radically alter how companies do business, enabling them to target new markets, streamline their supply chain, scale their services on demand and dramatically lower total cost of ownership (TCO). Being able to make transformational advances like these, rapidly and before competitors do, can lead to increased market share and higher margins, especially as development budgets are squeezed. This represents a more cost-efficient model for provisioning processes, applications and services while making IT management simpler and increasing business responsiveness. In a cost-benefit analysis, a properly implemented and used cloud computing model will drive lower cost-of-ownership, responsive delivery of services, and higher service quality. Cloud computing can enable rapid business innovation by delivering easy-to-use computing services to users "on demand," regardless of their location or the type of device they are using. The cloudbased service can be "public," "private", or combination of the two, sometimes referred to as a "hybrid cloud". Such flexibility is essential, especially in an economic downturn. Public clouds, for example will provide subscribing companies with access to enormous scale via externally supported infrastructures that are highly virtualized, automated and service oriented. And they



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IBM has been a leader in the evolution of clouddelivered technology through numerous hardware, software and services offerings. Thirteen cloud computing centers have been established worldwide, representing collaborations with business, government, academia, and other leading vendors. In addition, IBM is investing in more than 200 full time cloud researchers as well as building new data centers leveraging cloud and energy efficient technologies.

"Cloud computing does not need to be an all-or-nothing decision."

-Alan Ganek



do without necessitating an additional capital investment. Private clouds operate similarly but internally, enabling companies to leverage the scale inherent in their existing hardware, while dramatically improving the way resources are utilized. Private cloud adoption will be the first step for many organizations. Though driven by the short term need of data center consolidation and efficiency, many IT managers will be soon realize that private clouds offer an attractive approach for meeting long term business and regulatory requirements including audit, business process controls and security with less cost and with far more flexibility than traditional IT infrastructure.

By offering rapid, real-time access to vast computing power, storage and applications, both cloud architectures make it easier for companies to add new services and tweak or change their entire business model in response to evolving customer priorities and market challenges. And it's these kinds of business modifications that differentiate companies from their competitors."

How will concerns around data governance, availability and security impact the adoption of cloud services?

"Security continues to be a major stumbling block for public cloud services and may slow, but not thwart cloud adoption. The loss of data governance and privacy can put a company's intellectual capital at risk. Needless to say, cloud security is only as good as the cloud service provider's security controls and practices. These concerns will also push some of the early emphasis on Cloud adoption to the private Cloud based service, which offers many of the benefits of a public cloud computing environment. The difference is that in a private cloud-based service, data and processes are managed within the organization without the restrictions of network bandwidth, security exposures and legal requirements that using public cloud services across open, public networks might entail. In addition, private cloud services can offer the provider and the user greater control, improving security and resiliency as user access and the networks are restricted and designated.

Still, companies will take a practical approach in dealing with these issues. After all, there's no reason to subject a company's core processes to public clouds. Much can be gained using the public cloud exclusively for non-core, backend processes, which don't pose the same security risks. Today, there is definitely a significant tradeoff between security and availability risks and the benefits of public cloud. However, over time, cloud computing will make leading security and availability technologies infinitely more accessible, especially for enterprises that already struggle to justify them. Ultimately, companies will be able to access security products as a service, at a scale commensurate with their needs and the magnitude of impending threats, enabling smarter, enterprise-caliber risk management, but with less expense. Cloud computing does not need to be an all-or-nothing decision. Not every service is appropriate for the cloud, and some may never be. A hybrid approach allows companies to use cloud computing for less critical, fringe services and their own data center for the heavy-duty core applications that define the business. The point is that cloud is evolving as a viable IT delivery alternative, and the enterprise data center is sure to evolve with it—a good thing, by most any standards."

How are cloud services testing traditional thinking around "control of data" and "guarantees of safety"; to include ownership, access and rights that supersede failure of the provider? Ultimately, who should be accountable; vendor or service provider?



"The most prevalent view in the US courts today is that data stored at a cloud computing service provider should clearly remain the property in all legal senses of the company that creates and manages that data, just as they would if they were managing that data inside their own firewall; however, there have been some US court cases in which the court has issued a subpoena to the service provider for data "owned" by a customer of a provider of cloud services. In these cases, the assumption of the court has been that the services provider controls the data and therefore has the right to release it. Clearly, companies all over the world will strenuously object to their data being viewed as owned or controlled by anyone other than themselves.

Cloud service providers typically provide access agreements that specify who controls the data, guarantee access and retention safety of the data within the cloud and state customer rights in case of vendor failure; however these agreements limit their responsibility as relates to any failure, including any financial responsibility or liability from the loss or the unauthorized release of data. Many users are willing to accept that limitation either out of naiveté or because their data is adequately encrypted or backed up elsewhere. This lack of guaranteed accountability, control, access and survivability of data. There will also be companies offering services to audit and "certify" a cloud service provider's environment as meeting certain levels of data governance, security and resiliency. However, it will always remain the responsibility of the data owner to understand the limitations of the cloud provider's systems, design applications or data management strategies in providing an appropriate level of protection, accessibility and resiliency.

Ultimately, the vendor -- the business using the cloud -- is responsible for understanding the capabilities and limitations of their service provider and making sound business decisions to protect their data. However, these customers will be become increasingly demanding of cloud providers to commit to higher standards in service level agreements with respect to security, data protection, governance, and availability."

What are the SME benefits that would work well in a departmental setting? What are the key adoption barriers?

"For a small and medium enterprise company, public cloud services can shift much of the IT startup expense for business launch or expansion from capital expenditure to operational expenses, thus keeping a focus on paying only for the resources actually needed and actually consumed. Further, the client of a service provider can avoid much of the cost and effort of managing the hardware and infrastructure, reducing the need for on-staff experts. Finally, for those SME's that experience sudden and explosive growth, the cloud model allows dynamic scaling, unconstrained by the companies ability to grow and build out IT capability quickly on their own.

Small and medium enterprise companies will find that their adoption barriers for public cloud services are not unlike those of their larger brethren; data security, guaranteed availability levels, controlling configuration and management of services, controlling service latencies, compliance and compliance reporting under national privacy laws or regulatory guidelines. However, larger enterprise companies are more likely to employ experts who can evaluate the capabilities and limitations of the cloud service provider and weigh those risks and benefits against the expectations, regulations, internal policies and business goals of their company. The challenge will be ensuring that the applications are carefully selected to provide the levels of capability and availability required. This may take a lot more effort up front to find the right solution from the right cloud service provider."



Is dominance among a few industry giants a good thing for cloud computing? What are the implications for the rest?

"The cloud services market is likely to follow a tradition cycle in which well funded and early innovators will achieve some limited dominance in the market, followed by the proliferation of literally hundreds of smaller and niche players (start-ups), followed by an inevitable consolidation. It is impossible to predict at this time how accelerated or drawn out this market cycle will be, but initial dominance by the "industry giants" will not impede the adoption of cloud as a service delivery model. In fact, because there are at least ten "industry giant" companies that are well poised to take advantage of this new opportunity with different core competencies, cloud services adoption should accelerate. There are already a number of cloud service solutions spanning the infrastructure, operating platform, and application levels. For example, IBM's LotusLive software-as-a-service offering enables social networking and online collaboration designed for an intuitive set of business services for working within or across organizational boundaries. This can be part of a powerful menu of options for cloud adopters. Major technology leaders committed to open standards will evolve key interface standards which will bolster interoperability and leverage of a wide range of existing and emerging technologies.

As the market matures, hundreds of smaller innovators will undoubtedly find niche areas in which direct experience in an industry vertical or business model will create competitive differentiation in service design, pricing models and client responsiveness. They will also serve smaller market segments with less generic needs and lower revenue potential. That has always been the role of these firms as they enter the competitive landscape. They force the fine tuning and focus of the marketplace and often define which business models make the most sense.

The incumbent's continued success hinges on two key factors; maintaining thought leadership in the evolution and application of the cloud service delivery model, and demonstrating a proven ability to achieve measurable successful results in solving their customer's business challenges with Cloud technology."





From your perch, what is the meaning of "Cloud Services", and what are the most important benefits emerging from cloud services that will transform the economics of IT?

"I think of "Cloud Services" as the next generation of technology enabling "all" business to automate their processes. The initial phase of business automation was through mainframe technologies, the next phase client server and the most recent is web enablement. Large businesses have participated in and benefited disproportionately from each generation up to the Cloud generation. The Cloud will allow businesses of every size to realize the benefits of automation delivered as a software service at costs once only the largest most well capitalized companies could afford."

How will concerns around data governance, availability and security impact the adoption of cloud services?

"Initially these risk factors will slow the adoption. I believe over time companies will come to understand that Cloud providers are actually better equipped and more capable of managing security and availability as it will be a core competence defined as an SLA. If a Cloud provider can't deliver a secure and highly available service they will cease to exist over time. Is that true of anyone's internal IT group? Further mid size to small organizations generally can't fund redundant and highly secure environments that Cloud providers will provide as base level services. Data governance will be more complicated and will evolve over time. Cloud will force companies to improve their data schema and architecture similar to the ERP and Sales Automation wave of the 1990's."

How are cloud services testing traditional thinking around "control of data" and "guarantees of safety"; to include ownership, access and rights that supersede failure of the provider?

"Ultimately, who should be accountable; vendor or service provider? Cloud decisions are a natural evolution of decisions already being made: do I in source or outsource? What are my core competencies? I think IT is evolving to be analogous to supply chain management in the production of physical goods. Virtualization is allowing Cloud to be delivered cost effectively. The question will be do I run Cloud services inside the firewall or outside."

What are the SME benefits that would work well in a departmental setting? What are the key adoption barriers?

"SME and departmental groups are big beneficiaries of Cloud – principally because Cloud will enable and accelerate a host of software services delivered as SaaS directed at business decision makers. Today those decision makers in SME have limited options due to the cost and complexity



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Ignition Partners, is a premier private investment group with offices in Bellevue, Washington and Shanghai, China. The investment group's three categories of funds – early stage venture, growth capital and China ventures -brings together an unparalleled combination of domain focus, functional expertise and global operational experience.

"Cloud will allow businesses of every size to realize the benefits of automation delivered as a software service."

-John Connors



of in house solutions, and departmental decision makers are prioritized against other IT initiatives. Cloud will enable a wide variety of software services designed for specific business information and processes that are relatively low cost on a monthly basis and a low burden to internal IT. "

Is dominance among a few industry giants a good thing for cloud computing? What are the implications for the rest?

"Only the largest well capitalized and sophisticated players in IT can deliver the infrastructure services at scale. IBM, Google, Amazon, Cisco, EMC and Microsoft will lead this infrastructure business. Startups will have enormous opportunity delivering the applications and information services as well as pieces of the enabling infrastructure technology. Imagine all of the client server/DOS, vertical applications of the world moving to SaaS. Imagine SaaS BI. Then imagine SaaS supply chain and ERP. There will be tremendous innovation and opportunity."



Bruce Cleveland

Partner, InterWest Partners

What is the meaning of "Cloud Services" from your perch, and what are the most important benefits emerging from Cloud Services that will transform the economics of IT?

"I generally define "cloud services" as virtual development, application, computational and storage services available over the Internet that can be automatically and instantaneously provisioned and released as application requirements dictate. We aren't quite there yet in reality but the vision is well set.

The concept of replacing traditional computing resources with cloud services is gaining traction because for most companies their data centers and application software are not competitive differentiators. Consequently, every dollar invested in running these systems is a dollar unavailable to invest in differentiation. Just as the mainframe to minicomputer business proposition and the proprietary OS to Unix business proposition were simple, so is the business proposition of cloud services: dramatically reduce the cost of developing, provisioning and managing non-differentiating applications.

Cloud services will primarily use a variable expense pricing model based upon use. This pricing model has the potential to significantly disrupt the status quo of the incumbent global market application software and infrastructure leaders. As a result, I suspect that in 10 years, maybe less, we could see a different set of brand names leading the technology markets."

How will concerns around data governance, availability and security impact the adoption of "Cloud Services"?

"Today, the cloud services market is nascent and constrained due to its immaturity. There are various offerings that range from simple compute and storage services to higher level services such as application, development, and management services but no single provider offers a comprehensive and complete suite of services.

Service Level Agreements providing uptime and security guarantees, disaster recovery services and/or financial remuneration for failure to deliver vary widely. There are no industry or de facto standards in place. Current "brand name" cloud service providers don't offer the enterprise-class support and service that medium to large companies demand. Start-up cloud service providers are too small for enterprises to fully trust. These impediments are temporary though as competition will rectify most, if not all, of these issues."

How are "Cloud Services" testing traditional thinking around "control of data" and "guarantees of safety"; to include ownership, access and rights that supersedefailure of the provider? Ultimately, who should be accountable; vendor or service provider?

"These are interesting issues that must be dealt with by both end-users and some cloud services



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Investing since 1979, InterWest Partners is a leading diversified venture capital firm currently investing InterWest X, a \$650 million fund. With more than \$2.8B in capital under management, we take a long-term collaborative approach to venture funding, providing earlystage and ongoing capital, management development and access to a broad network of resources.

"The cloud services market is by its very nature conducive to start-ups."

-Bruce Cleveland



vendors themselves – those who are in turn customers of Platform-as-a-Service (PaaS) providers.

Ultimately, the vendor who contracts with a customer must be held responsible for providing the service they promised to deliver. This means that the vendor must secure a comprehensive Service Level Agreement with their PaaS provider and end users must demand a Service Level Agreement with their provider that meets and/or exceeds their needs.

Issues such as disaster recovery, hot standby, and overall application performance – not normally under the purview of "business users" – need to be considered and engineered into the contractual agreements. End-users need to be very careful and ask a lot of questions before fully committing to a provider.

That said, failure of the provider isn't the only risk.

PaaS providers who also sell their own applications may have a potential downstream conflict of interest with a company whose application they host. If they see their hosting customer succeeding, they may find themselves tempted to compete with them by launching their own application and possibly making life difficult for the original (now competing) application that they host. In that case, the PaaS provider would know everything about their customer's customers (who they are, usage rates, adoption rates, etc.) making them a formidable, if unethical, competitor.

End-users risk getting caught in the middle."

What are the SME benefits that would work well in a departmental setting? What are the key adoption barriers?

"Due to their initially constrained feature sets, SaaS applications have tended to get their foothold in small- and medium-size businesses. As SaaS providers introduce more robust features into their offerings they can migrate into larger enterprises and give rise to "departmental applications." This has already happened with Salesforce.com as they are now moving up market.

The key benefits to the SME market is that the SaaS business model can give them access to powerful applications they can use to run their business without most of the capital expense or IT investment typically required with traditional software.

Even in larger companies, departments such as marketing seldom have access to capital dollars or IT resources. SaaS uses a subscription model – a variable expense – and does not require IT resources. Therefore, the Marketing Automation market, which never materialized under the traditional enterprise software model, is now emerging and growing rapidly.

The key adoption barriers are consequently no longer tied to the size of a company. Instead, adoption barriers will primarily be tied to ease of use and business benefit placing the onus upon application developers to develop and deliver simple to use yet sophisticated application software."



Is dominance among a few industry giants a good thing for cloud computing? What are the implications for the rest?

"The cloud services market is by its very nature conducive to start-ups. The cost of entry and the technical barriers are relatively low – and should stay that way for a long time to come.

That said, consolidation is inevitable and will allow the best providers (whether of an application or of a platform for others to build on) to provide the stability and security that customers – especially larger customers – will require.

The ease with which customers can change vendors will allow new entrants the opportunity to challenge the giants and attempt to become giants themselves. More frequently, however, lower technical barriers will make it relatively easy for successful start-ups to integrate with existing giants through partnerships or acquisition.

Either way, new entrants will continue to bring new ideas, innovation and competition to the cloud services space, challenging giants there and in traditional software."



David Young

CEO, Joyent

From your perch, what is the meaning of "Cloud Services", and what are the most important benefits emerging from cloud services that will transform the economics of IT?

""Cloud Services" are a mixture of compute, networking, storage, management, and web services that allow customers to own and operate applications without regard to the underlying physical infrastructure. Typically these "cloud services" are sold in an on-demand model which provides the chief benefit for the economics of IT: not cost, but flexibility and therefore the incentive to innovate without long-term contracts increase risk.

Another important consideration in defining the cloud is how much effort does the operator of an application need to invest to maintain that application. If the operator does nothing, the infrastructure scales up and down without any effort, then the application is running on a true cloud. However, if the operator has network administrator using a third party piece of software to manage the servers that she has leased from a "cloud provider" then she is still running in a traditional hosting environment. Joyent is moving everyday, through acquisitions like Reasonably Smart and the addition of Zeus's application delivery controller, ZXTM, towards the vision of an auto-scaling cloud."

How will concerns around data governance, availability and security impact the adoption of cloud services?

"It depends. For departmental applications these concerns will be less important than the benefits of getting on-demand infrastructure at a low price and without contracts. For more central enterprise applications, clouds such as Joyent do provide secure solutions for customers, but this is more a benefit of Joyent's architecture rather than a business goal of Joyent to provide customers with special secure solutions. It is in Joyent's best-interest to provide secure, separable solutions for customers. Service providers such as Joyent have much more experience in providing secure solutions to customers than the customers themselves."

How are cloud services testing traditional thinking around "control of data" and "guarantees of safety"; to include ownership, access and rights that supersede failure of the provider? Ultimately, who should be accountable; vendor or service provider?

"Some cloud services provide traditional infrastructure but virtualized. In this case there is no real test of "traditional thinking". Other cloud services require a rewrite of the application to take advantage of auto-scale capabilities of the cloud platform (e.g. Google App Engine, Joyent Smart Platform). It is important in both cases that customers can reconstruct the cloud of the service provider privately. The question is only relevant if a cloud provider won't sell the technologies required for a customer to create a private cloud. Joyent does this for customers today. Most cloud providers don't."



www.joyent.com

Joyent is a Cloud Computing vendor of Infrastructure as a Service' (IaaS). Joyent's main product is a line of virtualized servers called Joyent Accelerators. Joyent's clients use collections of Accelerators to power largescale web sites and web applications. We make it possible for our clients to quickly move from an idea to a web application with millions of users - without the pain of large capital outlays and long-term vendor contracts. Joyent provides a more flexible and cost-effective alternative to buying and running your own IT infrastructure, while still providing all the security, cost stability, and enterprise-grade performance of a dedicated private data center.

"Joyent doesn't believe there is a dominant position held by the industry giants in the cloud computing market today."



What are the SME benefits that would work well in a departmental setting? What are the key adoption barriers?

"Since the company's inception, Joyent has been focused on the SME customer as well as the individual developer. The cloud offers this market some exceptional advantages and value. For the SME operator, the individual developer and even departments within the enterprise, Clouds allow each to innovate and try new ideas without committing to expensive contracts. If an application is wildly successful, the cloud can help scale the application. If the departmental application is not successful, the infrastructure is closed down without harm or foul."

Is dominance among a few industry giants a good thing for cloud computing? What are the implications for the rest?

"Imagine if the power grid was something that one could hook up to, supply it with power and easily start generating revenue by doing that. This would mean that anyone who had the ability, expertise and will could develop a new, more efficient way of generating power and make a business of it. The Internet is the power grid for cloud computing and it is VERY easy to hook up to. Add to this that the price of the power generation units (servers, software, etc.) is consistently going down and the implementation of open source practices keeps spreading and it becomes difficult to see how any one provider will become dominant.

Amazon is certainly in the lead, but it is, at the foremost, a retailer. Think of Nordstrom coming out with a line of cash registers and you understand the position Amazon holds. The other large system vendors are deeply conflicted between selling cloud solutions and either being arms dealers to the cloud/customers and/or providing cloud solutions themselves.

Only Joyent provides solutions at all three layers of the cloud. We provide cloud primitives (compute, storage, networking), cloud management software, and cloud services and are the only company that provides solutions at all three levels. We think this shows that the cloud market is very young and that agile, flexible providers such as Joyent have rich opportunities to pursue."



Serguei Beloussov

Chairman and CEO, Parallels

What is the meaning of "Cloud Services" from your perch, and what are the most important benefits emerging from Cloud Services that will transform the economics of IT?

""Cloud services" is the latest buzz phrase for the provisioning of scalable computing resources "as services" over the Internet. Cloud services include Applications (Software as a Service), Online Storage (Storage as a Service), Computing Infrastructure (Virtual Computing environments as a Service), Developer Services (such as Web Services), and Platform Services (build your own cloud).

The main benefits are:

a) Low cost of entry – no need to invest in infrastructure for customer demand that has not materialized yet

- b) Easy to add value build your own service(s) on top of other services
- c) Flexible billing pay per usage schemes
- d) Burstability scalability for high demand / spiky applications

d) Increased competition - services are not always the part of the platform, giving 3rd party vendors a great opportunity here"

How will concerns around data governance, availability and security impact the adoption of "Cloud Services"?

"This is clearly one of the biggest areas for the industry to overcome for widespread adoption by enterprise IT. It is chiefly a question of trust. Technically, at this time, there are no unsolved problems, though there might be some legislative issues in the future. However, adoption of cloud services is a gradual process; just like moving from gold to paper money and now, to plastic. The chief concern for most people though is safety and at present cloud services are safe. Even the most sensitive data, such as medical histories, could be safely processed in the cloud if done properly. As people use cloud services more and more over time and become more comfortable with them, public trust will continue to build, resulting in greater adoption."

How are "Cloud Services" testing traditional thinking around "control of data" and "guarantees of safety"; to include ownership, access and rights that supersedefailure of the provider? Ultimately, who should be accountable; vendor or service provider?

"It is always a vendor's responsibility to make sure data remains under control and stays safe from those who should have no access to it. In that sense, the Cloud's existence does not change much for customers, vendors and service providers. They must each work out agreements to protect data and each other's credibility and good business standing. Of course, this is impossible without implicit trust."



www.parallels.com

Parallels is a worldwide leader in virtualization and automation software that optimizes computing for consumers, businesses, and service providers across all major hardware, operating systems, and virtualization platforms. Founded in 1999, Parallels is a fastgrowing company with 800 employees in North America, Europe, and Asia.

"The cloud computing platform is a huge new empty field of innovation with a low entry barrier."

-Serguei Beloussov



What are the SME benefits that would work well in a departmental setting? What are the key adoption barriers?

"Through market competition, cloud services give SMEs access to a wide variety of useful services, removing the need to put an expensive physical infrastructure in place. The model also gives SMEs the flexibility they need, enabling them to scale up or down depending on how may "seats" are needed. The issue of trust is not such a barrier for SMEs, and in fact there are very few barriers to adoption on the side of SMEs, rather it is a lack of SaaS or cloud-ready solutions which is hindering adoption."

Is dominance among a few industry giants a good thing for cloud computing? What are the implications for the rest?

"Generally speaking, consolidating to a very small number of providers would only be good for those large companies, not for the rest of the industry and its end-users, who will benefit from competition and choice. The cloud computing platform is a huge new empty field of innovation with a low entry barrier – lowered by the dominant giants heavily investing in infrastructure. These large platforms are able to exploit economies of scale, so the only effective way for smaller companies to compete is through establishing niches either through customer intimacy in serving customer vertical niches (ie: music, real estate, etc..) or through innovating technologies that achieve better user-per-server densities. This increases server utilization and reduces management and administrative overheads to drive down the costs of running smaller platforms."



Brian Stevens CTO, Red Hat

From your perch, what is the meaning of "Cloud Services", and what are the most important benefits emerging from cloud services that will transform the economics of IT?

"Cloud services in the most basic form have enabled the internet for many years. Without core services which live within the cloud, such as domain name registries, the internet as we know it would not exist. Over the years meaningful services, largely targeted at the individual, have rapidly come online. Gmail, facebook, twitter, imdb ...

Cloud services are evolving, and with the advent of virtualization, ushering in perhaps the most meaningful cloud service yet: IT as a service. Enabling businesses to host new applications in realtime, scaling as they need, and paying for only what they consume. The net result is a lowering of both CAPEX and OPEX for the business, while affording them increased agility."

How will concerns around data governance, availability and security impact the adoption of cloud services?

"We are only at the dawn of bringing business applications into the cloud, cloud 1.0 if you will. Rather than judge cloud 1.0 by what it is not, the industry needs to take advantage of what it is. Today, it fills a real void for putting near infinite compute capacity into the hands of researchers and businesses. When and only when they need it. Cloud 2.0 will bring with it the reliability and security needed for enterprises to trust replicating their data in the cloud, and with that a new class of applications."

How are cloud services testing traditional thinking around "control of data" and "guarantees of safety"; to include ownership, access and rights that supersede failure of the provider? Ultimately, who should be accountable; vendor or service provider?

"Today there has been little progress on data reliability and accountability in the cloud. Service level agreements which claim great data reliability are typically limited to the cost of the service, not the value of the data. As cloud technology evolves, so too will the security compliance policies of the providers. Only when there is a match between those policies, and the governance policies of the most discerning of enterprises, will cloud 2.0 be realized."

What are the SME benefits that would work well in a departmental setting? What are the key adoption barriers?

"Smaller businesses are less likely to have large dedicated IT organizations, and cloud services are attractive in that they can augment their resources using cloud providers whose sole business is IT. Smaller organizations are also less likely to be able to amortize internal compute infrastructure across a broad set of business applications, making it quite powerful for them to



www.redhat.com

Red Hat, the world's leading open source solutions provider, is headquartered in Raleigh, NC with over 65 offices spanning the globe. Red Hat provides high-quality, affordable technology with its operating system platform, Red Hat Enterprise Linux, together with applications, management and Services Oriented Architecture (SOA) solutions, including JBoss Enterprise Middleware.

"The goal should be to drive great economics, for producers and consumers..."

-Brian Stevens



tap into large grids of compute power that economically they could not justify owning."

Is dominance among a few industry giants a good thing for cloud computing? What are the implications for the rest?

"The best outcome for industry will be to have standardized cloud services with low barriers for new providers and internal cloud hosting. In essence, to do for cloud services what Intel has done for commodity computing. It is advantageous for users to leverage cloud services, while having the flexibility to take advantage of more competitive providers in the future. They need be wary of custom APIs and services which will lock them into any one particular cloud. The goal should be to drive great economics, for producers and consumers, through the opening, standardization, and subsequent commoditization of cloud infrastructure."



Michael Crandell

CEO and Founder, RightScale

What is the meaning of "Cloud Services" from your perch, and what are the most important benefits emerging from Cloud Services that will transform the economics of IT?

"Cloud services -- and by extension cloud computing -- comprise a new way of delivering IT infrastructure that provides on-demand, pay-as-you-go resources from a virtually infinite pool that exists somewhere "in the cloud" (i.e. on the Internet) -- you don't know where and you don't care. What matters is that the resources are available whenever you need them, at a low utility price, and can be relinquished whenever you don't need them.

Software-in-the-cloud solutions sit at the top of the cloud services stack. These SaaS applications have been available for some time, and continue to grow in breadth and popularity rapidly. But what is really new in the last two years are the Infrastructure-in-the-cloud offerings, the pioneer of which is Amazon Web Services. These API driven services, based on virtualization and commoditization of both hardware and software components, are driving new levels of cost efficiency and flexibility in the way IT resources are delivered and consumed.

Anyone who has run a data center knows how expensive they are, both in terms of up front capital investment as well as ongoing costs for power, maintenance, and human support. Cloud infrastructure -- when properly managed and automated -- offers major savings both in terms of CAPEX and in ongoing costs, and at the same time provides a level of immediacy in provisioning, a kind of 'agile deployment', that is hard for companies to ignore.

That is why we believe cloud services are bringing a tidal shift in the way IT resources are delivered and consumed. As one IT leader at a major biopharma enterprise said to me, "If we can avoid buying another blade server ever, we will."

How will concerns around data governance, availability and security impact the adoption of "Cloud Services"?

"At the infrastructure level of the cloud, customers can now access a level of data center redundancy that is really compelling compared to the traditional hosting world. Add to that the entry into the market of multiple cloud providers, and with appropriate cloud portability in place, you can achieve a level of availability that is unprecedented.

Security remains a complex issue, depending a lot on the type of application being deployed, and the regulatory or compliance requirements. Many, many applications are not highly security sensitive, and can be run in the cloud today. Others can be solved by hybrid solutions using the right software architecture. For example, we currently power a HIPAA compliant application for one customer. And of course there are still applications that just aren't appropriate to migrate to the cloud yet.



www.rightscale.com

RightScale is based in Santa Barbara, California and offers a fully automated cloud management platform that delivers the scalable, cost-effective, on-demand power of cloud computing, while maintaining complete IT control and transparency.

"Cloud services are bringing a tidal shift in the way IT resources are delivered and consumed."

-Michael Crandell



As cloud infrastructure providers continue to improve both their networking and dataonboarding capabilities, as well as security features, the picture looks better and better."

How are "Cloud Services" testing traditional thinking around "control of data" and "guarantees of safety"; to include ownership, access and rights that supersede failure of the provider? Ultimately, who should be accountable; vendor or service provider?

"Concerns around data control and guarantees have been around for quite some time in the managed hosting and SaaS businesses. Most have been solved both contractually and through the de facto evolution of more and more larger customers gradually adopting external solutions. Who would ever let their mission critical sales data be managed by another company? Well, Salesforce has answered that question fairly conclusively during this decade.

That said, this is an evolving landscape and these issues will continue to be solved over time, by both vendors and service providers. Our best advice is to ensure that, in addition to having the proper legal pieces in place, customers seek solutions that are open and provide mechanisms to preserve their freedom to avoid lock-in."

What are the SME benefits that would work well in a departmental setting? What are the key adoption barriers?

"The cloud benefits of agility in provisioning, scalability, automation, and the concomitant cost savings apply equally well to departmental SME deployments as to enterprise-wide initiatives. In fact, what we see in the market is a shift in the locus of where IT purchasing decisions are being made from a centralized structure to business line owners and departments. The fact is that business managers are finding both shorter lead times and lower costs in cloud solutions.

Among customers we speak with, the main hurdles to adoption revolve around managing complexity in application design, lack of cloud deployment expertise, and the desire to find a fast on-ramp to the cloud. These are all issues that RightScale addresses."

Is dominance among a few industry giants a good thing for cloud computing? What are the implications for the rest?

"One of the key drivers of cloud computing is that, to the customer, resources appear to be virtually infinite, and inexpensive. Whether you need 10 servers or 100 or 1000 for a particular task at a given time, it is compelling to be able to allocate those resources within minutes, and pay-as-you-go at low rates. This on demand provisioning is a major distinguishing feature of cloud computing as opposed to traditional hosting or internal data center buildouts, and drives the cost advantage that is propelling the movement.

An unavoidable implication is that, at the infrastructure level, size plays a critical role in enabling the operational illusion of virtually infinite resources, as well as the economies of scale that drive down prices. Clearly, it is the industry giants who will be able to make the



capital investments at a scale that enables massive availability at compelling prices. And the larger you get at this game, the better able you can amortize usage over a pool of compute and storage resources. All of this points to consolidation.

That said, it seems clear that smaller players will also thrive by differentiating their offerings across any number of areas, which will of course be a good force in the market. For example, we already see signs that new cloud offerings are focusing on higher security, tighter SLAs, regulatory compliance, geographical locality, broader support, better integration with traditional systems whether hosted or internal, and feature differentiation in areas like storage and networking.

One area to watch closely is standardization. While the larger players can provide resources at a scale that benefits customers in terms of price and availability, their size and independence is already creating issues around standardization and lock-in. Most customers we speak with list this as their #1 obstacle in moving to the cloud, and that is why one of RightScale's key goals is to provide multi-cloud portability and a level of abstraction that preserves customer freedom."



Evangelos Simoudis

Managing Director, Trident Capital

What is the meaning of "Cloud Services" from your perch, and what are the most important benefits emerging from Cloud Services that will transform the economics of IT?

"Cloud computing is a computing style where resources are provided as a service over the internet. This style of computing has three benefits. First, the users of these resource/services (particularly business users) need not have knowledge of, expertise in, or control over the technology infrastructure that supports them. As a result, the use of cloud services reduces reliance on internal IT organizations thus reducing IT costs, and in certain cases allows companies to completely forgo the need for having an IT organization. Second, it allows organizations to better control their IT capital expenditures since they don't need to buy resources that will be used infrequently, if alternative resources are available in the cloud. For example, an e-retailer can use cloud-based resources to meet the extraordinary computing demand of significant shopping days, like Cyber Monday, foregoing the need for the e-retailer to purchase extra servers that will be underutilized during the remainder of the year. Third, it allows companies to better utilize their existing IT resources (computing, storage, etc) by organizing them into a cloud (in this case a private cloud). Instead of having several silos of underutilized IT resources dedicated to various departments across an organization, IT resources become available as services to the entire corporation, very much like virtualization technology improves the utilization of a computer."

How will concerns around data governance, availability and security impact the adoption of "Cloud Services"?

"Security is one of the biggest hurdles to the broad adoption of cloud computing and may limit the applications of this computing style, particularly the use of public clouds such as Amazon's. For example, moving personal data, including credit card data for applications such as e-commerce, to public clouds will be problematic. This concern, however, also presents opportunities for the development of new security applications that address cloud computing. Availability and other service level agreements (SLAs), such as response time and disaster recovery time, etc., are also areas that will require work before cloud computing can be adopted for a variety of applications. It is one thing if a program compiles slowly because the compilation is performed in the cloud but entirely different if a purchase transaction is slow to complete and a sale is lost because the transaction engine is running in the cloud. Many SaaS applications users have at times experienced availability that is inferior to that of corresponding on-premise applications (Salesforce.com's recent service outage is a relevant example of this).

Cloud computing also creates potential issues as it relates to maintaining audit-safe data. Compliance regulations auditors have historically required that certain information be stored in identifiable, physical locations. Clearly, compliance issues cannot ignored when making decisions regarding server infrastructure, software configuration and network deployment."



www.tridentcap.com

Founded in 1993, Trident Capital is a leading private equity and venture capital firm. Trident invests in software and technologyenabled services businesses worldwide and has been in the forefront of investing along every computing style from client/server to internet, SaaS and cloud computing. The firm has offices in Palo Alto, CA and Westport, CT.

"We see the lack of standards and the difficulty in porting existing applications to a cloud environment as significant adoption barriers."

-Evangelos Simoudis



How are "Cloud Services" testing traditional thinking around "control of data" and "guarantees of safety"; to include ownership, access and rights that supersede failure of the provider? Ultimately, who should be accountable; vendor or service provider?

"Organizations will need to complete careful data inventories and decide which of their data can reside in (or be processed by) public clouds and which will need to remain inhouse. As a result of this analysis they will need to revise their data architectures. See above additional commentary on my views around security."

What are the SME benefits that would work well in a departmental setting? What are the key adoption barriers?

"Through the use of cloud computing, SMEs and departments of larger enterprises will be able to use (in the form of services) resources which they could not purchase inhouse. For example, a parts manufacturer could use a public cloud to perform a detailed simulation of a new component being designed, whereas in the past such simulations may have been avoided altogether because the manufacturer didn't have the appropriate computing resources in-house. In addition to security, data ownership and data control issues, we see the lack of standards and the difficulty in porting existing applications to a cloud environment as significant adoption barriers."

Is dominance among a few industry giants a good thing for cloud computing? What are the implications for the rest?

"Several cloud computing startups have been founded over the past couple of years and are starting to bring their products to market. I expect that as the interest in cloud computing increases, several others will be created and will either work in tandem with the industry giants or compete with them. For example, we've seen several startups that are developing solutions to take better advantage of Amazon's cloud infrastructure. However, because the heart of cloud computing is the actual IT infrastructure, we expect that organizations will feel more comfortable buying cloud services from large vendors in order to mitigate the risks associated with startups. The current economic environment makes this issue even more pronounced. We think that the most successful cloud computing startups will form partnerships with the large IT vendors in an effort to improve distribution and marketing and many will ultimately be acquired by their large IT vendor partners."



Steve Herrod CTO, VMware

From your perch, what is the meaning of "Cloud Services", and what are the most important benefits emerging from cloud services that will transform the economics of IT?

"Cloud Services are applications and technologies provided to users in a way that follows the utility model most of us are used to with electricity and water. The end-user doesn't necessarily know or care where the service is coming from, and they typically pay just for the amount of services they use each month. This is in contrast to the computing model used today where a company spends a substantial amount of money up-front, buying their own machinery and then programming, maintaining, and operating it themselves to enable the applications that their business needs.

The two most important benefits of the cloud model are simplicity and efficiency. When someone else is providing a compute service, it allows the local IT department to focus more on the creation of new services the business can use and to let the cloud provider do much of the heavy lifting of running a datacenter. The economic model is transformational as well. Not only can a cloud provider benefit from the efficiencies of scale, but companies can shift many of their capital expenses (buying machines for their datacenter) into operational expenses (paying for just the amount of computation that they use each month)."

How will concerns around data governance, availability and security impact the adoption of cloud services?

"Like all new markets, there will be a series of early adopter users and applications that will explore this new frontier and provide the feedback we all need to improve it. While many companies are working to address the perceived challenges, we see customers looking for lowrisk ways to engage and experience cloud services. For example, many are exploring external clouds with non-production use cases like test and development, for disaster recovery, or for applications with less sensitive data. However, we also see them looking at strategic plans that include building internal clouds, or spanning their internal and external uses into "private clouds". By internal cloud, I mean an offering that is provided on-premise, by the existing IT department, but using the technologies and business practices of external clouds. In this case, the compute services are provided from the company's own datacenter and handled by their own employees. We see this as a case where compliance, security and availability guidelines may more easily meet their business requirements. A "private cloud" takes the benefits of internal clouds one step further by allowing IT to combine external and internal resources to create a seamless experience for the user, yet gain optimum returns in SLAs, resource allocations and cost of running IT."



www.vmware.com

Founded in 1998, VMware (NYSE: VMW) is the global leader in virtualization solutions from the desktop to the data center. VMware is one of the fastest-growing public software companies and is Headquartered in Palo Alto, California.

"A private cloud combines the benefits of internal and external clouds."

-Steve Herrod



How are cloud services testing traditional thinking around "control of data" and "guarantees of safety"; to include ownership, access and rights that supersede failure of the provider? Ultimately, who should be accountable; vendor or service provider?

"This depends on the relationship the user has with the provider. For example, in the case of an internal, private cloud built to serve business units or other corporate locations, the user experience relies on the management of the internal IT group. When moving applications and data to external clouds, users should have a clear understanding on SLAs, security, compliance and management/control issues. If the cloud provider is delivering a software stack through a web browser to the user, you may expect security and loss of data to be a liability to the vendor delivering the stack, considering you had no visibility to plumbing running the application. However, if you are explicitly buying infrastructure from a cloud provider, you're going to expect specific parameters on manageability, security, availability and much more. If this is the case, you'll want to ensure a reliable platform, connection, security and management are part of the discussion, as well as the liability of failures or breaches."

What are the Small Medium Enterprise benefits that would work well in a departmental setting? What are the key adoption barriers?

"SMEs will benefit from all the budding forms of cloud computing, including software-asservice (Saas), platform-as-a-service (PaaS), and infrastructure-as-a-service (IaaS). The ability to translate a capital expense into an operating expense affords an SME with better cash flow manageability, as well as simplicity in managing applications and infrastructure. The latter really means that the SME may need fewer, or at least differently focused IT staffers. A well-run cloud offering can also provide peace-of-mind if they focus on providing better availability and security than a smaller company's IT staff could do on their own.

Cloud resources can also provide efficient ways to handle the rapid growth or "bursty-ness" of an SME's business. Rather than own all of the resources needed to handle peak activity (for example, a Christmas-time sale), the SME can maintain the normal amount of compute resources internally, "flexing" to use a cloud provider's compute resources when needed. We see this federation of internal and external clouds as a very interesting direction.

The adoption barriers to explore the external cloud are relatively low when adopting new applications (such as payroll processing, CRM, or HR applications). However, they can be more daunting for existing applications that the SME relies on. For this reason as well as the concerns around security noted above, most cases SMEs may be aggressive in outsourcing some of the newer services while still being cautious in moving core applications out of their direct control."

Is dominance among a few industry giants a good thing for cloud computing? What are the implications for the rest?

"There will be a small collection of very, very large cloud providers, but we believe the world



will move to a distributed collection of compatible cloud offerings. We'll see many providers offering compute platforms that enable users to migrate business applications to any cloud that offer the greatest alignment with the needs of IT or the user, such as cost, location, availability, or even the use of green power. Achieving this world requires a lot of work around standards, but it is the same model that has worked well for electricity generation. Many different companies provide energy to our electrical grid using different technologies, and consumers don't need to worry about where it came on in order to turn on their toaster.

Many of today's large external cloud offerings have two main problems. First, they typically require a business to rewrite their existing applications into that cloud provider's framework. Second, because these applications are in a cloud-specific framework, the customer cannot easily choose another cloud provider, or move their application back on-premise, should they have such a desire.

We believe the industry will be best served by focusing on cloud platforms that allow any application to be provided in cloud service form, and on the standards needed for cloud interoperability. Nailing this foundation will then allow providers, start-ups and incumbents alike, to continue to innovate on both technical advances and business models, but in a way that allows IT departments the flexibility they're after for both today's and tomorrow's applications."





Silicon Valley

Laurel Group, LLC 1999 S. Bascom Avenue Suite 700 Campbell, CA 95008 408-879-2393 tel 925-215-2376 fax

Seattle

Laurel Group, LLC 6 Nickerson Street Suite 301 Seattle, WA 98109 206-729-7772 tel 206-216-5804 fax



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