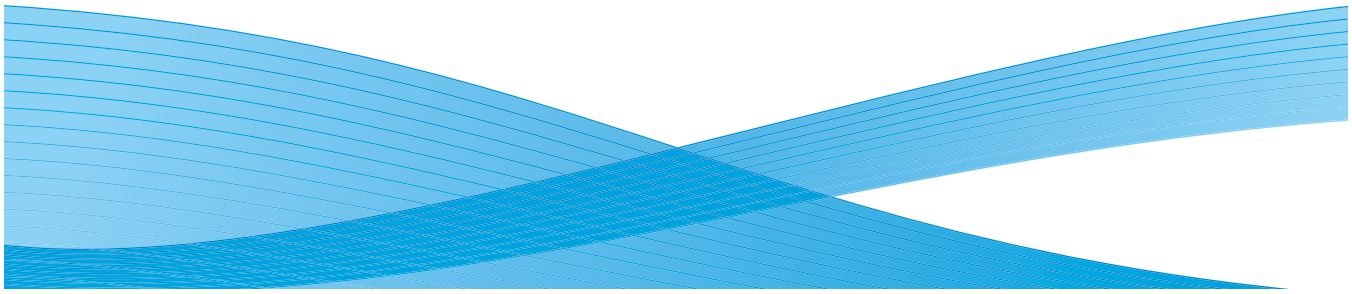
Can You Trust the Cloud?
A Practical Guide to the Opportunities and Challenges Involved in Cloud Computing.

Contents

Executive Summary 2
Portrait of a very hot topic 3
First things first: a practical definition 3
A simple cloud taxonomy 4
The power of the cloud. 4
A quick look at “next gen” documents. 6
Perceptual headwinds slow down the pace of adoption 8
The critical distinction between public and private clouds. 8
A closer look at security in a private cloud. 8
A key requirement for providers: a long record of success 9
Stay tuned for future developments 10



Cloud Computing

Executive Summary

Cloud computing is one of the hot topics of our day. And it deserves all the attention, because it has the potential to deliver a wide range of innovative services for the management of infrastructure, development platforms, software applications, and complex business processes more efficiently and cost-effectively than ever before.

It will also speed up the development of intelligent, proactive "next gen" documents that will improve the productivity of Knowledge Workers around the world,

But several challenges lie in the way before the cloud becomes a widely accepted paradigm for computing. There are concerns about security. And there is considerable confusion about the relative merits of public, private and hybrid clouds.

Nevertheless, cloud computing is fast-becoming a dynamic force in the business world. And forward-thinking clients have discovered that the right approach to cloud-based services can help them improve performance and create a competitive advantage today. For more information, please read on...

Portrait of a very hot topic.

When it comes to IT and the Internet, popular topics and buzzwords emerge on a regular basis. Web 2.0...social media...virtualization...the list goes on and on.

Right now, however, the subject that seems to be capturing the attention of the IT world is cloud computing. And some very prominent names are making bold predictions about its future. Just check the news from a single month—May 2010.

Cloud computing "represents the next frontier," Microsoft's Steve Balmer told a group of CEOs gathered in at his company's headquarters near Seattle.[1]

"The cloud will change everything," Dr. Ajei Gopal, a top executive with CA Technologies, told thousands of people at a company conference in Las Vegas. "Instead of being a monolithic supplier of technology services to the business, the IT department becomes the manager of a dynamic supply chain of internal and external resources that delivers services to the business and its internal and external clients."[2]

Across the country at a company convention in Boston, Joe Tucci, the CEO of EMC Corp., described the impact of cloud computing this way: "We're now going through what I believe is pretty much going to be the biggest wave in the history of information technology."[3]

According to marketing research firm IDC, cloud services will certainly have a major impact on the IT market. The projected five year annual growth rate of 26 percent is more than six times the rate of traditional IT offerings. IDC's forecast predicts we'll see $27 billion in net new IT revenue by 2013 and 27 percent will come from cloud services.[4]

So what's all the excitement about? And why are so many people calling cloud computing the Next Great Thing—especially since there's so much confusion about what "the cloud" really means?

We'll try to shed some light on these issues, since they are pivotal to any discussion about the future of information technology, Knowledge Work and the role of outsourcing in business transformation.

First things first: a practical definition.

In an attempt to demystify some of the confusion surrounding this popular topic, the National Institute of Standards and Technology offers this definition of cloud computing:

"Cloud computing is a model for enabling convenient, on-demand network access to a shared pool of configurable computing resources (e.g., networks, servers, storage, applications and services) that can be rapidly provisioned and released with minimal management effort or service provider interaction."

Wikipedia offers a more streamlined definition that captures the same basic points: "Cloud computing is Internet-based computing, whereby shared resources, software and information are provided to computers and other devices on-demand, like the electricity grid."

Bottom line? We're talking about shared technological resources, sophisticated services and business processes delivered like a utility over the Internet. And in a sense, there's nothing new about this, because it is the basic model for IT outsourcing, which has been around for years.

Cloud computing is also more pervasive than many people realize. Take the email you use every day, for example. In essence, this Information Age correspondence consists of data stored on a server that could be located just about anywhere inside or outside your firewall. It's also integrated with software applications that allow you to read, respond and file your email according to your own preferences.

In other words, there's a lot of complex technological machinery supporting your email. And it's not stored on your laptop or PC. So where is it located? One answer is this: In the cloud.

It could be a cloud that exists in your data center. Or it could be floating around in the digital universe we call the Internet. But for practical purposes, it's a cloud. The term comes from diagrams originally used to represent a powerful infrastructure supporting telecommunications and IT.

A simple cloud taxonomy.

If you think about the email example above, you can quickly understand one of the fundamental distinctions involved in cloud computing.

If your email server is located in an outsourcing partner's carefully controlled data center, it's part of a private cloud. If you use an Internet-based email program like Microsoft Hotmail, Yahoo Mail or Google's Gmail, on the other hand, the server that holds all of your email is part of a "public cloud" that can be accessed and used by anyone equipped with a computer and web browser.

Of course, there are other kinds of clouds out there in IT-land, including hybrid clouds, which combine public and private clouds in a customized configuration. Hybrid clouds are a sensible solution for a growing number of business applications.

There are also community clouds that are used by different organizations to achieve a common goal. Google's cloud for the U.S. government is often cited as an example.

All of these clouds offer advantages in terms of scalability, multitasking capabilities and multitenancy. And users can share a single application, database or other resources, which dramatically reduces the need for organizations to keep investing in their own computing resources.

Obviously, all of these variations on the cloud theme have different features, advantages and applications. But they all have the potential to improve the traditional paradigm for enterprise computing.

Let's talk about some of the general advantages of cloud computing. Then you'll understand why so many business leaders view the cloud as the next giant leap forward in IT, document management and Business Process outsourcing.

The power of the cloud.

Let's go back to the basics. Cloud computing provides an entirely new model for enterprise computing, because it converts a fixed-cost infrastructure into a new paradigm based on transactional, "pay as you go" fee-based services.

These services are divided into five basic categories:

- Software as a Service (SaaS)
- Application Components as a Service (CaaS)
- Software Platform as a Service (PaaS)
- Virtual Infrastructure as a Service (VaaS)
- Infrastructure as a Service (IaaS)

In essence, then, the cloud is a remarkably effective platform for outsourcing, because it turns so many fixed cost scenarios into services. As a result, you can tap into the cloud for your computing infrastructure, your software applications and a wide range of sophisticated business process services. Here are some of the benefits.

Unlimited storage for documents and data. You don't have to expand your data center or add servers to your network to get more capacity. Because all the storage you'll ever need is available right there in the cloud—24 hours a day, seven days a week.

Unlimited processing power. The same argument applies for processing power. With a direct pipeline to the vast computational power available in a public, private or hybrid cloud, you don't have to add more CPUs to your in-house IT infrastructure. You just use your web browser to get the processing power you need.

Dynamic flexibility and scalability. When you transform storage, processing power and software applications into a service, you don't have to build, manage and maintain a costly infrastructure designed to handle your peak capacity needs. Instead, you only pay for what you need and use, regardless of the peaks and valleys in demand. This flexibility can be a tremendous advantage to cyclical businesses as well as companies testing a new offering or product line. Instead of investing in permanent resources that you may not need in the future, you can simply tap into the cloud for what you need now.

Economies of scale. When you take advantage of a centralized infrastructure that supports multiple clients, you get an economy of scale that you simply can't achieve on your own. That's why cloud computing is the most cost-effective approach to enterprise computing.

Benchmark technology and the latest best practices. Leading cloud providers typically have the size and resources to offer innovative technology and the latest best practices. In fact, they have to. It's essential for their long-term success.

Streamlined implementations. As the focus in the services world shifts from customization to standardization, clients reap enormous benefits in terms of cost, quality and speed. The transformation of the cloud into a highly efficient platform for service delivery enhances these benefits, providing greater cost-effectiveness and faster cycle times for the entire development and implementation process.

More outsourcing options for small businesses. The traditional model of service development and delivery often priced small businesses out of the market for outsourcing opportunities. But thanks to the efficiency and scalability of the cloud, SMBs can now take advantage of a growing portfolio of world-class services.

More capabilities for real-time and online collaboration. As more documents, data and applications move to the cloud, it will be easier for Knowledge Workers to share information online, create and revise documents, and collaborate in real-time. In many cases, collaborative efforts will be enhanced by integrating popular document management applications and formats with social media. This heightened focus on collaboration is a fundamental part of the vision for the Web 2.0 world.

A sensible solution for a mobile workforce. With cloud-enabled access to technological resources, documents and data, it's easy for employees to work at home and on the road. As a result, the cloud can improve the productivity of an increasingly mobile workforce, facilitate the growing number of work-at-home programs and help companies attract and retain talented employees who want more flexible work options.

A greener approach to everyday business. By relying on the cloud instead of servers in a data center, companies can reduce the need for heating, cooling and overall energy consumption. Since cloud-based services facilitate telecommuting and work-at-home programs, organizations can also reduce carbon emissions caused by traditional commuting. In some cases, they can even reduce the need to build or lease costly office space, which also helps them lower their impact on the environment.

New models for "crowdsourcing." Cloud-based services like Amazon Mechanical Turk make it possible to outsource tasks that require human intelligence in a fast, cost-effective way. Mechanical Turk—which operates as a virtual marketplace for freelance talent—is one of the most prominent "crowdsourcing" options available today.

A quick look at "next gen" documents.

Those are some of the major benefits of cloud computing. But this emerging paradigm will also help organizations take full advantage of the dynamic capabilities of the next gen documents of the Document 3.0 age.

To provide some perspective, consider the long history of the document. It began more than four thousand years ago when people began to store information in physical containers. That was the essential feature of the Document 1.0 era. And it applies to everything from clay tablets and papyrus to modern business reports printed on bond paper.

The next inflection point—Document 2.0—came with the development of digital documents in the early days of the Information Age. These documents were obviously very different from physical documents. But just like their predecessors, they were essentially rigid containers for information. And they locked the information inside.

In the 3.0 era, documents will take another bold leap forward. Here are some of the highlights.

Dramatically improved access to information. Since documents will primarily be based in the cloud instead of on individual hard drives or corporate servers, they will be easy to access from any computing platform equipped with a web browser. This accessibility will help Knowledge Workers collaborate and find the information they need, right when and where they need it.

Open standards and structure. In the years ahead, proprietary document formats will gradually disappear, replaced by open standards like Extensible Markup Language (XML). These standards will make it easier for people to work on and share all types of documents.

Liberated content. Open standards and other innovations will bring structure to unstructured information. As a result, all of the information stored inside digital and physical documents will eventually be as easy to search and access as a well-designed database.

Documents that are proactive, intelligent and evergreen. In the not-too-distant future, documents will become proactive agents working on our behalf without our conscious involvement or direction. They will automatically update the content they contain. They will adapt their formats to our viewing preferences and different reading technology. And they will help us automate time-consuming steps in document-driven business processes. All of these improvements will increase organizational efficiency and Knowledge Worker productivity.

More powerful one-to-one communications. The next generation of documents will automatically search databases, social networks and the Internet for information and insights that will make their content more relevant to the target audience. This cloud-enabled capability will have a big impact on the effectiveness of marketing and customer communications.

Elimination of the barrier between physical and digital documents. With the widespread use of imaging and the development of innovative technologies for natural language processing, tracking and content mining, it will be easier to add structure to the information they contain and bring them into a fast, efficient digital workflow. As a result, the barriers between physical and digital documents will gradually disappear.

Document Management as a Service. Organizations of all sizes will be able to take advantage of complex, document-driven workflows based in the cloud to streamline their business processes. They will simply need to scan documents to the cloud for processing, transformation and storage. These documents can also be created online in a fully electronic format. Then they can be linked with other documents or content and shared with other users through social media and other means. In addition, these documents can be personalized to the reader's implicit or explicit preferences and delivered to any device, whether it's a printer, e-reader, iPad or anything else. Document Management as a Service will also provide a complete audit trail for traceability, which will improve information security and management control.

Even though these capabilities may seem visionary today, they are all based on research that is currently underway. In addition, there will undoubtedly be other exciting developments to talk about in the next stage of the document's evolution, which will be directly linked to advancements in cloud computing.

Perceptual headwinds slow down the pace of adoption.

Despite the potential impact of the cloud on efficiency and productivity, many organizations are reluctant to embrace it today. What's the reason for the hold-up?

A number of senior leaders have concerns about the safety, security and privacy of information stored in the cloud. Others worry about the loss of control over documents and data and the reliability of cloud-based services.

Certainly, there are stories in the news that keep these issues on the corporate radar. In May of 2010, hackers successfully attacked a Department of Treasury website hosted by a third party. That story got a lot of attention. And there were a series of stories in 2009 about temporary outages involving Google's popular Gmail email service.

Despite the well-known advantages of cloud computing, some organizations are also concerned about the longevity of their cloud-based service provider. In a world where companies come and go at a rapid pace, you have to wonder what will happen to your sensitive files and information if your provider goes out of business.

Last but not least, there is a concern about content access in the future, since the technologies we use to create and read documents may change.

Given these issues, it's no wonder that many organizations are taking a "wait and see" approach before they make a major commitment to cloud computing.

Unfortunately, waiting too long could put you at a competitive disadvantage if other companies in your industry begin to improve their efficiency and agility with cloud computing.

In addition, not every cloud is the same. So the well-publicized concerns about cloud computing don't apply equally to every cloud out there in the digital universe.

The critical distinction between public and private clouds.

Let's revisit the important differences between public and private clouds from an outsourcing perspective,

The public cloud refers primarily to third-party providers who deliver services—often in a self-service model—through the Internet. Because of this open environment, there are understandable concerns about security, privacy and service reliability.

Private clouds, on the other hand, are gated communities connected to the Internet where access, security, disaster recovery processes and almost everything else can be more easily controlled. Nevertheless, they can still offer significant economies of scale as well as best in class technology.

A closer look at security in a private cloud.

Thanks to their scale, long history and extensive experience, private cloud providers often establish security and disaster recovery systems that are much more effective than client organizations can create on their own. In fact, it's a mission-critical requirement.

Of course, no approach to security is perfect. But leading providers can create a trusted environment for client documents, data, applications and business processes by using layered technology, redundant design and a customized approach to tenancy that lets clients choose how isolated they want to be in a multi-tenant or shared service environment.

Leading providers should also employ state-of-the-art best practices like ISO 27001 and Information Technology Infrastructure Library (ITIL), which is a comprehensive set of best practices for the management of IT services. And they should base the design of their systems on the same core principles that provide state-of-the-art information security in any environment.

- Security measures must be designed to support the business, not impede it
- The system should incorporate a "defense in depth" approach. Defense in depth involves multiple layers of defense spread throughout the IT infrastructure. The concept was originally developed by the National Security Agency.
- The design of the security system must be flexible enough to adapt to changing business conditions and evolving technology.
- The use of standards is essential to prevent misunderstandings and provide the agility needed to respond quickly to risks.

By taking this comprehensive approach, private cloud providers actually set the standard for information security today. In addition, it's important to remember that the entire cloud computing industry is constantly working to improve security, interoperability and privacy. Organizations like the Cloud Security Alliance and the National Institute of Standards and Technology, which is known around the world for its expertise on cyber security, are leading the way.

A key requirement for providers: a long record of success.

Now let's consider another prominent issue. Can you count on your provider to deliver the service reliability you need today and tomorrow?

In a fast-changing world, there are no guarantees. But that shouldn't hold you back from taking action to transform your business today.

Instead, you should look for a partner with a long history of success, a reputation for innovation, a proven commitment to quality and continuous improvement, a global scale, and the experience and expertise to provide a trusted environment for your documents and data.

These are the same basic qualities that most clients look for in any outsourcing relationship. And they certainly apply to services delivered through the cloud, regardless of whether you're talking about public, private or hybrid clouds.

Stay tuned for future developments.

As the cloud continues to evolve into a new paradigm for enterprise computing and service delivery, work will continue on all of the issues we have touched on in this white paper.

In addition, leaders in the field are working to develop standards that will ensure the portability of applications and data and make it easier for clients to integrate services from different cloud providers.

Another issue that needs to be resolved is software licensing so applications can be converted from traditional licensing agreements into "pay as you go" utilities that provide the economy and flexibility clients expect from the cloud.

For all of these reasons, cloud computing is a work in progress, just like the biggest cloud of all—the Internet itself. Nevertheless, thanks to the remarkable advancements that have already taken place, the cloud—in all of its variations—is ready to change the way organizations operate on a day-to-day basis.

It will give organizations a better way to manage the technological infrastructure that supports virtually every business activity.

It will provide Knowledge Workers with better access to information and deliver new tools and processes for collaboration, all of which will increase their productivity.

It will also lead to a rapid expansion of outsourcing services that will help companies of all sizes improve their business processes and their approach to document management.

As we mentioned before, cloud computing is inseparable from the concept of outsourcing. So the ultimate issue isn't really whether or not you can trust the cloud. The most important question is this: Can you trust your cloud services provider?

If the answer is yes, there is no reason to postpone the decision to take advantage of the benefits of this powerful paradigm.

If you trust your partner, make the giant leap.

Go cloud!

- For more information on the future of cloud-based documents, read Francois Ragnet's white paper, Document 3.0: How the next generation of dynamic documents will improve the way we work.
- For an additional discussion of the status of cloud computing, read ACS' ITO Perspective on Cloud Computing: "Is It Ready?" ACS, a Xerox Company.

1. Ballmer, Steve. *Seizing the Opportunity of the Cloud.* [Remarks by Steve Ballmer, CEO of Microsoft, Microsoft CEO Summit 2010, Redmond, Wash., May 29,2010]. Retrieved from Online Web site: http://www.microsoft.com/presspass/exec/steve/2010/05-19ceosummit.mspx

2. Boston.com, A New York Times Publication, May 11, 2010.

3. Network World, May 18, 2010.

4. Gens, Frank. *Enterprise IDC's New IT Cloud Services Forecast: 2009–2013.* Retrieved from Online Web site: http://blogs.idc.com/ie/?p=543

About the Authors

As Managing Principal of Technology Innovation for Xerox, Global Document Outsourcing, François Ragnet leads a team charged with transferring novel technologies into mainstream Xerox solutions offerings. Current initiatives focus on text-, image- or feature-based categorization of documents, as well as identifying deeper semantic analyses which will enable "smart document" generation from traditional legacy formats or paper. His team also focuses on enhancing current offerings within the office environment to improve the efficiency of current products and streamline support processes.

Previously, Ragnet served as program manager and senior project leader for the Xerox Research Centre in Europe where his team provided innovative technologies in support of next-generation Xerox offerings. Their goal was to provide solutions that allow users to filter, configure and extract information from documents across advanced platforms that bridge production, printing and scanning. François was also a project leader in wireless technologies—specifically mobility and wireless (Bluetooth), content management, security, print and infrastructure management.

While at the Research Centre of Europe in Grenoble, France, Ragnet was a founding member of the Technology Showroom—a showcase of experimental technologies that hosts international events with customers from all over Europe.

Prior to joining Xerox, Ragnet was a researcher at the National Institute of Standards and Technologies, in Gaithersburg, MD, where he focused on creation of a demonstration platform for state-of-the-art collaborative work technologies. He holds a master's degree in telecommunications from the Institut National des Telecommunications, Paris, France.

To learn more about François' work, visit www.xerox.com/thoughtleadership_ragnet

Christopher Leach is a senior vice president and chief information security officer at ACS, a Xerox company. In this position, he is responsible for overseeing the development and execution of policies that protect the private and personal information of the company's clients, employees and business partners.

Prior to joining ACS, Leach served as senior vice president and chief information security officer for First Horizon National Corporation in Memphis, Tennessee. There, he implemented a security strategy for that company's 500 branch banks in more than 43 states. He also developed a risk-based approach to security assessment and remediation and worked interdepartmentally to balance the overall risk of the enterprise.

Following seven years as managing partner of Leach Consulting & Accounting in San Diego, California, Chris began his IT risk career as national director of IT risk for Grant Thornton LLP, a Chicago-based accounting, tax and business advisory firm.

He entered the financial services industry in 2001, joining Bank One Corporation as senior vice president and chief technology officer, IT risk management. Following JPMorgan Chase's acquisition of Bank One in 2004, Leach became senior vice president and director of global security operations and identity management, where he was responsible for identity initiatives for 170,000 employees and contractors and more than 20,000 business partners.

The author of several articles for both accounting and information security-related publications, Leach has conducted seminars and served as a keynote speaker at the Microsoft Worldwide Partner Conference. He was also recognized twice by Accounting Today as one of the Top 100 Most Influential People in the accounting profession.

Leach has a Bachelor of Science degree in accounting from Brigham Young University, where he also undertook postgraduate studies in information technology.

Xerox is a world leader in document outsourcing services with expertise that helps you reduce costs, achieve operational excellence and grow revenue. Our unique combination of experience, technology and delivery capabilities enables integration, transformation and continuous innovation of your office environment, centralized print production, and communication and business processes. We deliver excellence in every corner of the world—locally, nationally, globally.

For more information, visit www.xerox.com/globalservices or www.xerox.com/thoughtleadership today.