Enterprise Cloud Computing

*An introductory guide for CIOs, by Jon Pyke*

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With over 30 years' experience in the field of software engineering and product development Jon is considered to be one of the most influential figures in the Business Process Management (BPM) sector. As CTO of Staffware plc (now Tibco) for over 12 years, he can truly claim to be one of the founders of BPM as a means to implement a process improvement culture in business.

He was personally responsible for defining many of the key software metaphors that enable BPM to work, and as Chair of the [Workflow Management Coalition](#) (WfMC), he has also overseen the development of standards. As one of BPM's great thinkers. He is an excellent public speaker and has written and published a number of articles on the subject of Cloud Computing, Office Automation, BPM and Workflow Technology.

More recently Jon has Co-Authored a book covering both technical and business aspects of Cloud Computing. The book, published by Meghan-Kiffer Press, is called [Enterprise Cloud Computing](#).
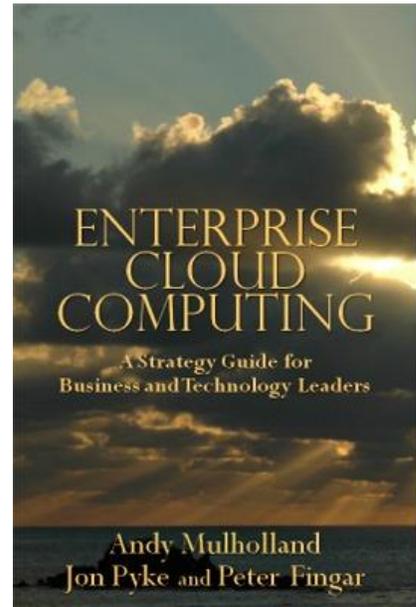
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Oh how things have changed!

Have you ever sat back and pondered the impact of the internet and world wide web has had on your daily life? It's hard to imagine the extent of change we have seen in the past 20 years. There is almost nothing we now do in our daily lives that does not involve accessing and using the internet. This ubiquitous "thing" is now so tightly bound into our very existence that you have to stop and wonder how we used to do things.

It's worth taking this moment to understand just how far we have come before we can look to the immediate and mid-term future to try and anticipate where we go from here.

Consider these facts:

The internet has only been in "commercial" use by the general public since early 1995. The growth has been breathtaking. In 1984 there were around 1,000 internet devices in use around the world. This number had grown to around 1,000,000 by 1992 to a point sometime in 2006 where 600,000,000 where in regular use – who bothers to count anymore?

One of the first companies to exploit this brand new route to market was Ebay – founded just one year after the first public emergence of the web it has now grown to a point where their revenues exceed $6 billion per annum. Can you imagine how long it would have taken to reach the customer base of Ebay through older, more "acceptable" mediums? It is estimated that to reach an audience of 50 million people would have taken:

- 38 years using radio
- 13 years using television
- 4 years via the web

Consider also the humble text message. That ubiquitous mechanism used by us all to instantly communicate with our family, friends and colleagues. We just take it for granted and yet it only in 1992 that the first commercial text message (SMS) was sent. Today – in a single day – the number of text messages sent exceeds the population of the planet – **in a single day**.

When do you stop and consider where you used to get answers to simple questions? Where did you go before the advent of the "humble" search engine, or more specifically before Google? Every month more than 3 billion searches are performed by Google alone – that's 3,000,000,000 every single month.

Can you imagine?

The phenomenon that is social networking will probably be with us forever. The success of these sites must have exceeded everyone's wildest expectations. For instance, did you know that if Facebook were a country it would be the 5th or 6th biggest country in the world by population. The latest statistics state that Facebook has 800 million active users. Think about that for a moment 800 million is over 11% of the world's population. More than – one person in every 10 has a Facebook profile! Consider the real percentage of internet users that are registered on Facebook; when you take into account all of the people that don't have internet access, or all of the young and old, it constitutes a huge percentage of the connected population who use it.

What is more astonishing is that a statistic on the Facebook web site states that 'More than 3 billion minutes are spent on Facebook each day (worldwide)' ! Do the math! How many minutes in a man year!

With readily available access to almost all of us, we can all indulge our wildest dreams. It takes little effort or talent to become a published author, over 3,000 new books are published every day. The music industry has been completely changed through the ability to download music on demand.

The underlying infrastructure needed to support the advance of the web has been changing to. It is now possible to send 10 trillion bits of information per second down a single optical fiber! That equates to about 1,900 music CDs or 150 million simultaneous voice phone calls every second. It is estimated that this capacity triples every 6 months.

Making long term predictions is almost impossible, given how far we've come in the past 20 years.

However, taking Moore's law as a starting point it is reckoned that by 2049 a $1,000 computer will have the computational power of the entire human race. But given the rate of change in the last 20 years who would bet on it taking that long?

Amongst all this change is the difficulty it gives us in planning. Not just business planning, but social and educational planning as well. Our education system is preparing students to do jobs that do not yet exist. Business is evaluating technologies that will be obsolete before they are implemented. And we are trying to anticipate how we might solve problems that we don't know are problems yet.

It's tough.

A Brave New World?

If all of the above is not enough to contend with, then consider the events of 2008. What has happened is unprecedented in modern times. The change that world has gone though and continues to go through is what recessions are all about. Fast, inevitable and unavoidable.

The restructuring of the world industries and economies is going to be immense. Seemingly stable and trusted institutions have disappeared overnight. It's not at all clear which direction organizations will be pushed in but they do not have to be passive onlookers while these forces do their worst. They can be harnessed as an opportunity and for inspiration one can look no further than the words of the Sage of Omaha- Warren Buffet – for inspiration - "A simple rule dictates my buying: Be fearful when others are greedy, and be greedy when others are fearful. And most certainly, fear is now widespread, gripping even seasoned investors."

The need to Change

To lead in this business environment is to embrace change. That means your business operations must be both thorough and yet still quickly adaptable. It's no longer just what

you do that counts, it's how you do what you do—and how quickly you can modify your methods to take on new opportunities and challenges that's really important.

The Perfect Storm

We know that most of the world's economies are in recession and the credit crunch has steepened the slide. Policy makers around the word are racing to contain the damage and there are calls for the expansion of government spending, taxes and regulation. In some quarters there are calls for a radical revision of current economic systems and the end of capitalism.

The current situation was created by a perfect storm of mutually reinforcing trends and policy mistakes:

in the United States the loose monetary policy by the FED post 9/11, the housing policy that encouraged home ownership by those less able to pay, the growth of leverage and the use of complicated derivatives, poor and lacking governance and an oil price shock. In the UK, Lord Turner, the chairman of the Financial Services Authority in the UK, said "The 'mistaken philosophy'- putting too much faith in banks and markets' ability to correct without a crash - had allowed a credit boom to grow unchecked".

All of these factors resulted in a housing bubble that became a recession. To quote Albert Einstein "We can't solve today's problems using same kind of thinking we used to create them."

Clearly it's time to apply some different thinking. To change the way we do things and the place to start is with the tools that are at our disposal. And as we have seen those tools are changing, and changing rapidly. The next wave is a seismic shift, a shift which will change forever how we use Information Technology. This shift is totally disruptive. This shift is called the cloud. And that's why it is now the time to take the cloud seriously.

But what exactly do we mean by "The Cloud"?

The Cloud

The entire field of Computing is fast becoming a "cloud"—a collection of disembodied services accessible from anywhere and detached from the underlying hardware. And as we mentioned earlier, the cloud has the potential to alter dramatically the way we buy and use IT services.

The Cloud and its potential!

The advent of cloud computing could have a greater impact on business use of IT than the PC revolution did in the 1980s. The flexibility and potential cost savings of using applications accessed via the web will fuel adoption across the board.

With the average user already using web-based applications independently of the corporate IT department there is growing pressure on management to look at the technologies and how best they can be used within the enterprise. This means that it is becoming increasingly difficult to the fortress approach of keeping all I T within the confines of the corporate network to be sustained. Corporate IT cannot continue to resist the wave of change that has so dramatically affected our way of living.

But what, exactly, is the cloud? Well let's ask it. A quick Google search returns a Wikipedia response of:

"Cloud Computing is a computing paradigm shift where computing is moved away from personal computers or an individual application server to a "cloud" of computers. Users of the Cloud only need to be concerned with the computing service *being asked for, as the underlying details of how it is achieved are hidden. This method of distributed computing is done through pooling all computer resources together and being managed by software rather than a human."*

In his Book Peter Fingar makes it even simpler to understand. He says: "The Cloud is the "real internet" or what the internet was really meant to be in the first place, and endless computer made up of networks of networks of computers." - For geeks, Cloud Computing has been used to mean grid computing, utility computing, software as a service,

virtualization, Internet-based applications, autonomic computing, peer-to-peer computing and remote processing—and various combinations of these terms. Process factories, anyone? For non-geeks, Cloud computing is simply a platform where individuals and companies use the internet to access endless hardware software and data resources for most of their computing needs, leaving the mess to third party suppliers.

There will be many ways in which the cloud will change businesses and the economy, most of them hard to predict, but one theme is already emerging. Businesses are becoming more like the technology itself: more adaptable, more interwoven and more specialized. These developments may not be new, but the advent of cloud computing will speed them up.

As Joseph Tobolski of Accenture so rightly points out, that although the term Cloud Computing is quite new, the concept has, like most of these things, been around for some time. We can look back onto timesharing and virtual machine concepts that were about in the late 1960s and early 70s. Sun talked extensively of "the network is the computer" as far back as 1982. We also had a go at applications on demand (Application Service Providers) during the DOT COM boom.

What makes the cloud real is the maturation of the internet as a platform, reliable virtualization, commoditization and standards.

An analysis of Cloud computing in the Economist stated that there were a plethora of data centers worldwide and estimated that 7,000 data centers existed in America alone. Most of these data centers were one-off designs that had grown over the years. Many surveys show that these data centers are highly inefficient. According to McKinsey, a consultancy, and the Uptime Institute, a think-tank, on average only 6% of server capacity is used. Nearly 30% are no longer in use at all and many organizations are unaware of which application is running on which server. What a waste and think of the impact on the environment!

According to IDC a quarter of corporate data centers in America have run out of space for more servers. For others cooling has become a big constraint and often utilities cannot provide the extra power needed for an expansion. IDC believed that many data centers will be consolidated and overhauled.

Hewlett-Packard used to have 85 data centers with 19,000 IT workers worldwide, but expected to cut this down to six facilities in America with just 8,000 employees by the end of this year, reducing its IT budget from 4% to 2% of revenue. HP is not alone and the Perfect Storm will speed up this trend as companies strive to become more efficient.

This Cloud of computing resources will not only effect the number of data centers and the number of people employed in them – it will have profound implications for the organization. On one level the cloud will be a huge collection of electronic services based on standards. Many web-based services are built to be integrated into existing business processes. IT systems will permit organizations to become more modular and flexible and this will lead to further specialization. In the Cloud it will become even easier to outsource business processes, or at least those parts of them where firms do not enjoy a competitive advantage. This also means that companies will rely more on services provided by others.

Furthermore, there will be not just one cloud but a number of different sorts: private ones and public ones, which themselves will divide into general-purpose and specialized ones. People are already using the term "intercloud" to mean a federation of all kinds of clouds, in the same way that the internet is a network of networks. And all of those clouds will be full of applications and services.

Cloud Benefits

In certain ways, the business benefits of the Cloud should be so obvious that the revolution should have happened already! The high-risk strategy in the gathering recession is to batten down the hatches and do nothing. The lower risk strategy is to exploit the new cloud capabilities to break the sclerosis of legacy, gaining process change flexibility and agility, and the ability to take out operational costs – all vital in managing a business through very challenging times.

If you were to carry out a search via Google of "cloud computing benefits" you will get thousands of hits – a scan of the first couple of results pages will give you pretty much

what you need – a set of benefits that cover more or less the following topics (the source of the "typical" list below is

1. **Scalability:** IT departments that anticipate an enormous uptick in user load need not scramble to secure additional hardware and software. Instead, an organization can add and subtract capacity as its network load dictates. Better yet, because cloud-computing follows a utility model in which service costs are based on consumption, companies pay for only what they use.

2. **Easy Implementation:** Without the need to purchase hardware, software licences or implementation services, a company can get its cloud-computing arrangement off the ground in record time — and for a fraction of the cost of an on-premise solution.

3. **Skilled Practitioners:** When a particular technology becomes popular, it's not uncommon for a whole slew of vendors to jump on the bandwagon. In the case of cloud computing, however, vendors have typically been reputable enough to offer customers reliable service and large enough to deliver huge datacenters with endless amounts of storage and computing capacity.

4. **Frees Up Internal Resources:** By placing storage and server needs in the hands of an outsourcer, a company essentially shifts the burden placed on its in-house IT team to a third-party provider. The result: In-house IT departments can focus on business-critical tasks without having to incur additional costs in manpower and training.

5. **Quality of Service:** Network outages can send an IT department scrambling for answers. But in the case of cloud computing, it's up to a company's selected vendor to offer 24/7 customer support and an immediate response to emergency situations.

And so on and so forth. All good and valid benefits but Cloud computing goes way beyond the benefits listed above.

The advent and take up of the cloud will have a profound effect on the way IT departments are accounted for. More and more of the expenditure will be seen as variable costs as we shift from a buy and own model to a pay as you go – and a shift from capital expenditure to operational expenditure.

This will also drive down the overall costs of the organization and make IT much more like a utilities provider.

Furthermore, as we witness the inevitable drive to the cloud more business users will turn directly to ondemand cloud solutions to satisfy the IT needs. As a result the IT dominance as the technology provider will reduce over time.

"During the past 15 years, a continuing trend toward IT industrialization has grown in popularity as IT services delivered via hardware, software and people are becoming repeatable and usable by a wide range of customers and service providers," said Daryl Plummer, managing vice president and Gartner Fellow. "This is due, in part to the commoditization and standardization of technologies, in part to virtualization and the rise of service-oriented software architectures, and most importantly, to the dramatic growth in popularity of the Internet."

Plummer said that taken together, these three major trends constitute the basis of a discontinuity that will create a new opportunity to shape the relationship between those who use IT services and those who sell them.

But what does that mean to the business and IT?

According to Russ Daniels, CTO Cloud Services at HP, "something profound is occurring, something that will extend the reach of information technology to vast new markets, increase its value to existing ones and change the structure of the IT industry." He goes on to say in his blog "Cloud services enable businesses to create richer, deeper relationships with customers, to treat each one as an individual, to customize offerings to meet the specific needs of each, and to integrate with the business partners to make this happen smoothly, and affordably". We might also add – on demand as part of well defined, compliant business processes.

So to answer the question – what does it mean? – it means that it's all about business services delivered on demand to the right place at the right time at the right cost. There will be an ever diminishing requirement for business users to fund the purchase and deployment

of large enterprise applications – they will take specific services to do specific tasks when required.

As we shall see below, the key mechanism for delivering these services will be process management techniques.

What this means to the business

The CXO-level messages become 'we break the sclerosis of legacy, so you can have more nimble systems in the face of major challenges that will required agility' and 'here is a route to taking out operational cost at a time when you know you need to get your cost base down.' Process control technology in the cloud provides the key with which to unlock the status quo – and is key to delivering.

Commodity services – the undercroft – en route to the Cloud

One set of the technology-enabled Business Services drawn on/required by this approach are data processing, data storage and network services.

Their standardization and commoditization does not, *per se*, make them creatures of the Cloud – but it does make them strong candidates for the Cloud. We already have a quite rich world of both commodity and specialist infrastructure services platforms. BT's high capacity fiber network within the City of London is an example. The specialist platform supplied by Apple for the myriad of ventures innovating iapps to feed the i-phone is another – as is the salesforce.com apps platform (force.com and appexhange).

Let's not forget that there is also great nervousness in certain industries at the very idea of moving their 'highly secure data centre in the basement' out into the Cloud (assurance of business continuity, security, risk management, regulatory and legal compliance etc).

So the recognition at CXO level has to be that some of the benefits of commoditization and 'elasticity' can be harvested outside the Cloud, that much more can and will be in the Cloud, and that the journey into the Cloud can and will be made business-safe! The ability to decouple decisions about how a business sources its infrastructural 'undercroft' from decisions on how it manages its front end processes is the important message here.

What's a cloud application?

A *cloud application* leverages the Cloud in software architecture, often eliminating the need to install and run the application on the customer's own computer, thus alleviating the burden of software maintenance, ongoing operation, and support. Here are some characteristics and ways to tell if it's in the cloud.

- If you need to send a 40 page requirements document to the vendor then it's not cloud.
- If you can't buy it on your personal credit card... it's not a cloud
- If they are trying to sell you hardware... it's not a cloud.
- If there is no API... it's not a cloud.
- If you need to re-architect your systems for it... It's not a cloud.
- If it takes more than ten minutes to provision... it's not a cloud.
- If you can't de-provision in less than ten minutes... it's not a cloud.
- If you know where the machines are... it's not a cloud.
- If there is a consultant in the room... it's not a cloud.
- If you need to specify the number of machines you want upfront... it's not a cloud.
- If it only runs one operating system... it's not a cloud.
- If you can't connect to it from your own machine... it's not a cloud.
- If you need to install software to use it... it's not a cloud.
- If you own all the hardware... it's not a cloud.

How do I make the cloud deliver?

As we have already discussed, there will be not just one cloud but a number of different sorts: private ones and public ones, which themselves will divide into general-purpose and specialized ones, and all of those clouds will be full of pre-defined and readily available services. Accessing and provisioning these services is a very different proposition from what we think of as applications today, it therefore represents a very different opportunity

and is a mechanism whereby a user can put together an "application" based around normal working patterns, using readily available services.

This means that is possible to handle any sort of business problem usually tackled by enterprise solutions by being able to leverage the capability to associate virtually any number of web services within the context of an application. Service Provisioning is effectively an application generator within a process and is inherently more flexible, easier to provide, easier to manage and easier to use than traditional "ERP" type products.

It's all driven and controlled by well-defined processes and process management techniques that utilize a Business Operations Platform capable of orchestrating and provisioning of services and resources on demand at exactly the right place at the right cost. Making the Cloud work for you is all about control, change and speed.

Being able to invest more in "new development" and innovation to increase business agility and efficiency are top priorities for most progressive CXOs.

To survive and flourish in the cloud, you need a platform to stand on.