Would you jeopardise your business by giving up your in-house IT infrastructure and running mission-critical applications on a server somewhere out on the Internet?

The Informed Executive looks at the development of cloud computing and examines the business case.

Working under a Cloud

Computing changed beyond all recognition when it became clear that the desktop PC could one day outstrip the performance of mini-computers and mainframes. Clearly, there were physical dimensions to that change, with a dramatic reduction in the 'real estate' needed to deliver the information resource.

But there were major *cultural* changes around an industry that had assumed a near ecclesiastical status within the corporates that could justify purchasing a £1 million+ mainframe. None but the 'chosen few' ever had access to the inner sanctum where the central processors churned away under the watchful eye of a priesthood keen to preserve an aura of mystique around their craft. Air-locked data processing centres added to the illusion that computing was something very special and accessible only to the true *cognoscenti*.

The appearance of the IBM PC, small Unix machines and compact Intel-powered servers heralded the demise of the *ancien regime*. The concept of computing almost as an end in itself gave way to a more encompassing and more accessible world of Information Technology.

Servers linked to dumb terminals

For all its spurious authenticity, however, old-time computing had its advantages. Users were linked to the core processing resource over industry-standard protocols from relatively inexpensive 'dumb' terminals to share applications and data.

There was less opportunity for multiple copies of almost – but not totally - identical data files to be accessed by members of the organisation, while a centralised IT resource helped corporates lock down most access security issues. Adding a new member of staff involved little more than the purchase of an additional terminal and listing an extra log-in on the mainframe's user file.

Despite processing speeds which were a mere fraction of those of the modern machine and communications that were distinctly pedestrian, these old shared environments actually delivered a reliable and efficient service to users: the principle of shared resources was seen for the benefits it provided.

Move from bureaux and IT centres

Devolving 90% of the IT requirements to desktop computers saw performance in the late '80s and '90s improve as processing speeds, local storage and memory capacity all increased by an order of magnitude every year.

Where data had to be accessed across a team, Ethernet derivatives provided the in-house pipeline to shared data storage. Putting the performance of these early technologies in context, the first IBM PC with in-built storage (the PC-XT) was launched with a 5MB hard drive. The pioneering Xerox Ethernet, meanwhile, was clocking up a breathtaking 1 Mbps.

For users outside the immediate orbit of the in-house network, X.25 packet-switched technology provided the communications infrastructure. This multi-layered protocol was probably the single most important driver in the rise of multi-site enterprise computing.

In the UK from 1984 until the liberalisation of wide-area communications in 1992, X.25

There is nothing fundamentally new about the technology supporting cloud computing: remote servers have been delivering business services over wide area networks for the best part of three decades.

services were provided by the BT-Mercury duopoly. While there was more competitive pricing in that period, many smaller and medium scale users still found their services too expensive to implement.

As a footnote to history, the cable TV telecoms operators which seized the opportunity in 1992 to offer telecoms over their cable networks made a concerted attempt to offer competitive wide-area services to the business community. Demand for enterprise-wide networking at an acceptable cost was stimulated.

Desktop IT lowered costs

Finance directors welcomed the move to distributed computing environments. The technology required lower capital expenditure, the freeing up of expensive space on premises and much lower support costs.

Communications supported by the Internet Protocol (IP), which was the logical successor to X.25 as a universal communications standard, brought down further the cost of remote working.

Corporate activity could be supported more easily – and more cost-effectively - on virtual private networks (VPNs) 'carved out' of the telcos' public circuits. Progressive increases in the speed of broadband that could be delivered that way has accelerated demand and triggered a downward spiral in operating costs.

Managers recognised a change in the dynamics of their businesses, with staff who could be networked more cost-effectively, no matter where in the world they might be. Core IT resources could be located in a single data centre, for example, split between sites on three continents if required, and backed up in other locations.

Some of the old IT issues remained, however. Were the corporate resources being tapped on those distributed networks responsive to the changing demands of the user community? Many sectors have experienced dramatic changes in the way they operate.

The UK has seen manufacturing activities move progressively off-shore while design and development remain here. In those situations, there has to be an effective virtual private communications network spanning the geographically dispersed parts of the business.

Financial sector drove change

The financial services sector is probably more experienced at changing IT demand than most other parts of the economy. Big Bang in 1986 had turned the City from a largely paper-based environment to electronic trading, a trend which continued for the next twenty years. After a period of continuous growth in the demand for IT resources through the 90s and the early years of the last decade, many financial services institutions found themselves being forced to 'change shape' virtually overnight as the sector's tectonic plates shifted.

The turmoil within the financial community served to highlight a problem that was being experienced right across the commercial and manufacturing sectors. How could businesses cope with a sudden re-sizing of their operation?

Re-sizing issues for IT

Those forced into mergers and acquisitions had to accommodate new staff on existing networks with perhaps only limited capacity, while executives who were downsizing their operations found expensive IT systems not being used efficiently.

And with potentially gigabytes of sensitive corporate data sitting on the desk of every member of staff, there is an ongoing security risk. Elements of the media are never slow to root out stories about civil servants leaving PCs stuffed full of sensitive personnel data in parked cars.

Less high profile are the USB sticks being used every day to bleed competitive information from employers' systems.

The operational differences over the years have appeared is in the speed of access, the performance of the remote processors, the resilience of the data centres and the cost of communications.

Cloud computing is more than a means of hosting corporate computing resources off-site. It involves a further development in the way businesses work, but one which appears capable of changing business practices for the better.

While a multi-billion dollar industry has been evolving to build security into every aspect of information technology, many businesses find it expensive to implement at the level required. Larger networks of discrete IT resources could put at risk the integrity of a business and lay it open to charges of negligence under data protection rules.

Clearly, there has been a need for changes in the way organisations source and manage their IT requirements in a fluid economic environment. Key features of the old centralised computing need to be integrated with the benefits of distributed information systems. but is that approach either technically feasible or commercially acceptable?

Is cloud computing a compromise?

'Best of both worlds' rarely means what it says. It usually implies a compromise; a solution which excels in its mediocrity, where all of the factors involved are improved from one perspective or another but none quite attains the high standards which users should have every reason to expect. It was with a note of scepticism, therefore, that IT industry commentators first viewed what has come to be known universally as 'cloud computing'.

Cloud computing is more than a means of hosting corporate computing resources off-site. It involves a further development in the way businesses work, but one which appears capable of changing business practices for the better.

It is an approach to IT which on first inspection appears to offer the benefits of the old mainframe environment combined with the flexibility of desktop computing. Rather more important is the way that those resources can be funded under a cloud regime.

Instead of organisations making one capital commitment to purchase the hardware and another to acquire the software that now accounts for an increasing proportion of total IT costs, companies effectively rent both the hardware and the software, paying only for the resources that are actually employed.

Reducing capital expenditure

From the FD's perspective, it offers the prospect of moving most IT expenditure from the balance sheet to the profit & loss account. At a time of restricted bank lending, reducing pressure on capital costs has to be a good idea: replacing these with rental payments can make considerable financial sense if the terms are correct.

At face value, cloud computing could indeed offer the best of both worlds. But is it anything more than a case of style over substance? If it can be shown to live up to the claims that its vendors and the more objective industry analysts have made for it, cloud computing is a serious option that users across the spectrum should be considering.

Any logic in rental argument?

The case put forward by the proponents of cloud computing is straightforward. Rather than support even a limited IT resource in-house, organisations would be better off taking space in a processing and storage facility off site, which they access over high capacity IP links.

Fundamental to the business model is that those resources are not owned by the user, but 'rented' as required. And with apparently infinite processing capacity available at the end of the IP line, there is the prospect of complete scalability. At one end of the spectrum, it can accommodate a single user; at the other, an enterprise with thousands of end-users, whose IT requirements are liable to change on the fly. That scaling can be the product of mergers and acquisitions, or – more likely in today's economic circumstances – a down-sizing of activity. §

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From theory into practice

"If we can overcome any remaining resistance to running mission-critical applications off site, executives will see the double benefits of reduced cost and greater resilience. **Software as a Service** will be a major driver in business processes."

Alex Parker, CTO of Commensus PLC

For an industry perspective on cloud computing, we turned to the UK vendor Commensus PLC; a company whose revenues are derived from delivering the platform and applications through a hosted environment, known as C-VIP.

Such a supplier could be expected to make a convincing case for the Cloud, so it was worth examining closely the arguments which Alex Parker, the company's Chief Technical Officer put forward.

Tracking surveys on the subject of cloud computing, it is clear that many executives are still hesitant to take the step: their view is that they would no longer be able to 'touch and feel' the systems which drive their business.

Parker is not surprised by this reaction, but feels there is sufficient experience of remote working to allay those fears. "Data centres have been on the scene for three decades or more: what the Cloud offers is only a logical development of that service. There is little evidence of there ever being problems over access to data. And with comprehensive service level agreements that specify virtually continuous availability, any remaining concerns should be put aside."

No history of data centre failure

That is an entirely reasonable point: Press reports about the failure of data centres or problems experienced by corporates over access to their bureau data centre are noticeable by their absence.

The individual users of those bureau services accessed applications based on remote servers: from their perspective, seated at their 'thin client' desktop terminals, the software was being delivered as a service with their organisation paying for as much or as little usage that was required.

The liberalisation of telecoms services across Europe in the early '90s encouraged new operators with extensive communications capacity and data centres. Indeed, a complete generation of data centre operators emerged, offering highly secure and resilient facilities.

Application Service Providers were much in evidence at the 1999 World Telecoms event – which provided a foretaste of what would be rolled out over the following four years.

The business model was that ASP vendors would be hosting specialist applications for delivery on demand. Issues of network performance and the economics of accessing applications over IP connections with speed generally limited to the low Mbps range tended to hold back the adoption of ASP solutions.

Cost of communications has fallen

With the falling cost of virtual private IP networks and leased dedicated IP lines, however, it has become financially viable to provide virtually any application on demand, and this has evolved into the concept of Software as a Service (SaaS).

As Parker observed, "If we can overcome any remaining resistance to running mission-critical applications off site, executives will see the double benefits of reduced cost and greater resilience. SaaS will be a major driver in business *processes*."

Above: Part of a typical data centre serving cloud computing customers worldwide. A combination of high reliability servers, high quality communications and extreme security makes renting space in this type of facility an attractive proposition.

With the falling cost of reliable, high-speed communications, it has become viable to provide virtually any application on demand, and this has evolved into the concept of Software as a Service (SaaS).

Can **renting** applications and processing capacity offer any advantages over an **outright purchase** of IT solutions?

According to Alex Parker, CTO of Commensus (right), outright purchase is probably not the best option: "If a company has acquired IT solutions with the capacity to take it forward three or five years, it is paying for resources on which it cannot generate a return on capital. Changed circumstances may mean that the capacity is never fully taken up."

Fundamental to the Software as a Service (SaaS) argument is that software is rented rather than purchased outright. Finance directors will immediately draw a comparison between the two routes and demonstrate that after typically 2½ or 3 years, the rental payments on exactly the same resources would appear to exceed the capital cost: it would therefore make little sense to accept a rental agreement.

While that break-point may be correct at first sight, Alex Parker of Commensus argues that there are important considerations to be taken into account. "It assumes that any equipment purchased is being fully utilised from the outset.

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More meaningful comparison

If the financial model were changed to one where the only cost were a rental charge that related directly to the usage at any time, the purchaser would not be paying for under-utilised resources.

If capital cost were then compared with rental costs, the break-even point would be pushed out several years into the future and demonstrate the real financial benefit of the solution.

No less important from the users' perspective is the cost of maintaining the software they are employing. Where a software licence is purchased outright, upgrades may be provided free for a limited period, but the cost of upgrading to the latest version will become an ongoing expense further into the implementation. This has to be taken into account when calculating the true lifetime cost of the application licence if purchased rather than rented.

Speed of implementation

A factor which few executives take into account is the timescale for implementing IT investment. Apart from the time needed to reach a decision within the organisation, there is usually a lead time on the delivery and installation.

And while those windows are narrowing, capacity is out of sync with requirement. A cloud computing environment, with on-demand application software, eliminates any lag in resource provision.

As Alex Parker observed, IT managers are under pressure to supply services quickly to any staff that their company may take on board. "The scaling of the IT resource needs to be instantaneous. This applies even to the delivery of communications links where the applications require large amounts of bandwidth.

"There has been a constraint until now over running those applications remotely. A good example would be AutoCAD, which it would have been inconceivable to run as a SaaS over a public IP network. While the potential number of users demanding access to AutoCAD running in this mode may be small, cloud computing would certainly make it feasible."

Changing the software culture

Cloud computing is having the effect of changing the way in which software is acquired, even though the remote hosting does not lend itself directly to particular applications.

A good example is Adobe Creative Suite 5.5, which is regarded as probably the best integrated set of graphics, page make-up and web development tools on the market.

As the suite of applications has always been sold outright, it has only found its way into corporates and design studios: the current £2760 price tag for a licence to one of the packages of Adobe applications precludes the smaller business and individual user.

The recent introduction of a subscription scheme costing £140 a month for the same functionality should take CS5.5 into a much broader market. But the significant feature of the subscription offering is that the software is loaded on to the user's own computer rather than held remotely on a server.

While CS5.5 is not being offered as a cloud computing service, the change in culture which The Cloud is already helping to achieve, is permeating through business practice. §

Software as a Service provides that rental charges relate only to usage at any time. This ensures that an organisation is not paying for under-utilised resources, as it would with a capital purchase.

While Alex Parker and his colleagues at Commensus appear to be making a good case for cloud computing, do the potential downsides of the technology outweigh the benefits?

There is the inevitable resistance from executives who claim that there is an inherent risk in moving key operational resources to The Cloud. While there are few doubts that the operators of the various cloud environments will run servers and data storage safely and securely, the wide area communications links must surely pose a risk.

What is the likelihood of failure?

Failure in the pipeline to a cloud network – whether VPN or dedicated IP networks – could mean that all of the terminals linked over that connection would fail simultaneously. How does Parker convince his customers that they will not constantly be at risk of failure?

"The market we address primarily is weighted towards the enterprise – essentially any organisation that has its own IT resource. In practice, that would normally mean about 25 users upwards.

"In those situations, we would replicate the in-house IT facilities and recommend point-to-point connections between our data centres and the customer. Service Level Agreements with the Carriers guarantee high bandwidth without contention. A secondary line running over the public IP network would provide additional resilience if required.

Alex Parker was keen to note the costs involved. "Significantly, the cost of providing point-to-point bandwidth has fallen sharply, so that a 100 Mbps line over 15 miles, for example, supports around 25 users and costs only £10,000 a year right now. While that may sound expensive, the same circuit was around £14,000 a year twelve months ago."

Does every cloud have a green lining?

Cloud computing is being sold into the business community on the strength of the financial savings that can be achieved by tailoring the supply of IT resources dynamically to the users' requirements. The environmental benefits - or otherwise - of adopting this method of working do not normally figure high on the list of considerations.

Commensus, however, sets out to stress the 'green credentials' of cloud computing, although the arguments could be made equally well by many other vendors in the same sector. 'Green' in this context relates to the saving in energy consumption by a cloud computing environment compared with the energy required to sustain the equivalent IT facilities on clients' premises.

Alex Parker cites the use of Intel L – lower energy - processors in its HP servers in the company's data centres. "We provide upwards of 500 virtual servers running on just 50 physical servers, and that is where most of the energy saving is achieved. Our calculations show that we are reducing carbon consumption by the equivalent of around 12,100 tonnes a year.

"No less important from a financial perspective is that we are saving our clients energy costing around £1.9 million a year at present."

There are also significant cost savings for the client. Commensus estimates that an organisation running 30 desktop machines and 10 servers in-house could reduce its power consumption by around one half. Parker speaks from experience: "From our perspective as IT users, we are seeing the benefit of those savings. Our offices in Westminster, for example, are now totally thin-client, and the Surrey centre is already 80% thin-

How far can cloud computing reduce a company's energy consumption and promote carbon savings?

Examining technology platforms

Once satisfied about the reliability of the communications involved, executives considering a switch to cloud computing start looking beyond those links and into the remote data centre itself.

The platforms on which the applications are running vary in the features they provide. Commensus, for example, was an early adherent of VMware Enterprise Plus, an architecture which its developer VMware claims will ensure that every virtual server being supported is 100% protected from any potential physical failure. The company opted for this when the business moved to offer cloud solutions in 2007.

Scalability *should* be a two-way road. Cloud computing vendors are happy to demonstrate that they can take a client from 20 workstations to 80 and back to 50 again in the time it takes to authorise the online paperwork. But can they make a case for taking a service right down to the smallest businesses which account for 90% of all the business and not-for-profit organisations in the UK? So long as there is a viable IP service available to the user, the benefits of The Cloud should be made available to this important demographic.

Commensus launched such a facility in June 2011 after six months of trialing. Being branded as V-Cloud Professional, the email and application hosting services are being targeted as what the vendor sees as a one-stop cloud shop where end users control directly the resources they require.

For a monthly subscription of under £10, for example, users have access to a Microsoft Exchange Mailbox and a copy of the Microsoft Sharepoint collaboration tool. Application software including the hosted version of the Microsoft Office series is available. Perhaps most significantly, the vendor has been able to package a 'subscription' deal for an SIP-conformant telephone handset which completes the 'office in a box' solution.

Apart from the obvious benefit of minimising the capital cost of setting up in business, this hosted arrangement is clearly going to assist the kind of organisation where a user has to share and synchronise emails, diaries and files both with other users and across diverse technologies such as the Blackberry, smartphones and laptops. §

The Cloud make its possible to support a business with one user. But can it be made financially attractive?

This assessment of cloud computing is published by The Informed Executive Magazine.
Tel: 01483 419 411
www.informedexecutive.co.uk
editorial@informedexecutive.co.uk

It features Commensus PLC,
1 Vincent Square,
London, SW1P 2PN
Tel: 020 7993 9399
sales@commensus.com

Data centres have to prove resilience

Parker believes that this was an important strategic decision that has been justified by results. "It has helped ensure 100% resilience across our entire platform. This has been achieved by utilising multi-tiered security protocols at every level of our architecture. We adopted it to provide the reliability demanded by enterprise customers and other users who have applications that must be running as close to 100% uptime as possible.

"Many smaller users in the financial services sector do not have their own IT operations and must therefore rely on the quality of an outsourced operation."

Supporting its claims for virtually infinite scaling 'on the fly', the company points to its five tier 3+ data centre facilities in London, Frankfurt and Paris. "All of our facilities are connected by a protected private fibre network, and each data centre has its own internet breakout through diverse providers."

From an operational security perspective, the tier 3+ sites are geographically replicated so that there is mirror operation at a site different from where the client's operations are being hosted.

Objection to data held overseas

While the prospect of running applications and storing data offshore is not an issue for most companies considering cloud computing, there are sectors – financial services in particular – where this would not even be considered as an option.

According to Commensus replication in those instances is between geographically separated data centres within the UK. This achieves the desired technical result without breaching regulatory constraints.

There are inevitably claims being made in the industry about cloud computing that may never be substantiated: it cannot turn water into wine; it will not eliminate the need for skilled professional IT experts to advise on enterprise strategy.

But what it certainly can do is deliver IT services which match the clients' requirements and at a price which reflects the value of those services to the business. The pages of this magazine may be reporting on the successor to The Cloud in future editions. 'Future' is the operative word. §