

The Cloud: Time for Delivery

The Question is not “If”, but “How, Where & When”



People matter, results count.

Have we reached a game-changing moment?

The current mood in the industry is one of confusion. Are the new technologies of cloud, mobility, and big data, as many in IT would say, an evolution of what we do today? Or is there a game-changing revolution in play as many in the business world seem to think? As this paper demonstrates, both sides are in fact correct, but only because they have totally different views as to what clouds can deliver to their respective areas of responsibility. The challenge for businesses and governments is that both sides of the Cloud are required for their success in meeting changing expectations externally and internally.

The leaders of the 'for' and 'against' are thin client vendors and those vendors still heavily dependent on thick clients, meaning PCs, respectively (thin clients depend on the majority of the computing to be done by another computer). As enterprise IT, as we currently understand it and use it, is built on thick client, client-server applications then it's a fair argument that we continue to need PCs, but conversely the business people, whilst acknowledging the need for enterprise IT, are looking to escape its model to take advantage of new 'online' business solutions. Therefore, solutions using the Internet, the Web, and services on demand from 'clouds' in a 'mobility' context of devices with wireless connectivity are all based on thin clients, and take place in a Web environment surrounded by 'big data'.

It's the term 'business solutions' rather than 'technology products' that gives the real clue to answer the question of whether this is a true game-change or not. Business managers



use the term 'innovation' to define a generation of new business models that allow them to access and sell to their markets in new ways. The solutions that they want to deploy are only possible because we have new capabilities by using the new technologies together with different development and deployment methods that radically change time and costs. Cloud technology provides the key to delivering this, with mobility and big data technology playing supporting roles.

Andy Mulholland
Global Chief Technology Officer
& Corporate Vice President,
Capgemini



least embrace that same spirit.

All enterprises and public agencies face a series of game-changing shifts as a result of new technology infrastructures, devices and behaviors. Much of this is being driven by people, either as customers, employees, or citizens actively using their personal technology devices in an increasingly 'digital' society developing new expectations. Businesses and governments find themselves being 'driven' by these expectations rather than in the case of internal IT being able to decide when and in what to invest.

Cloud has the potential to help businesses and governments meet their challenges by offering increased agility and lower costs. Of course, this potential will only be realized after enterprises start taking the steps needed to seize the Cloud opportunity.

The key questions for decision makers should now be:

- How do we start using the Cloud?
- Where are the best opportunities for doing so?
- When can we realize benefits from the Cloud?

This paper introduces some of the tools we can use to answer these questions, so that companies and public agencies can start taking advantage of the Cloud – individually and collectively. But first let us close this introduction with two questions that reveal the two very different aspects of cloud technology:

1. Do business users buy Apple iPads to use internal enterprise IT better, or to escape the limitations in order to use new services and do new things?
2. Has the IT department changed its methods of operation by using virtualization to embrace new development and testing methods?

The Question is not “If”, but “How, Where & When”

Talk about cloud computing has become ubiquitous, both inside and outside organizations. The question for businesses and governments is no longer if cloud is a tool for improvement, but how to take action to maximize the advantage of cloud to address contemporary challenges.

The marketing hype around cloud has left many skeptical, confused and cautious about how to use cloud in the private and public sectors, and what using it might mean in practice. With such feelings, it is perhaps not surprising that the response to cloud computing has been slow, and the evidence of results is hard to come by. Early adopters who have succeeded in creating differentiation in their industry are not inclined to share their experiences. Like the meteorological clouds above us, the reality of cloud computing is hard to pin down: used either to re-brand a technology offering or to conceal the lack of any real business solution. However, as more private and public enterprises make use of the Cloud, both the distinctiveness of the offering and the reality of the benefits are becoming clearer.

Many papers have focused on explaining and advocating the technical features of the Cloud. Here we will take a different view – looking at what cloud means for the overall strategy of the organization. To do this we will focus on how clouds can be part of business solutions to the challenges that companies and government departments face, rather than on the different types of cloud on offer, or the underlying technologies involved. In this paper, we have used easily-recognized examples from the public sector for consistency and at the end we provide a brief technology outline of cloud computing, mobility and big data in respect of their linked functionality.

Many organizations face challenging times with reduced spending, more demanding customers and citizens, and sustained, profound demographic change. Corporations and governments are now acutely aware that doing the same things slightly better will not be enough to control budgets and meet customers' and citizens' expectations. New approaches are needed that will deliver better products and services that are 'twice as good, in half the time, for half as much' – or at

The 'Inside-Out' and 'Outside-In' Models for the Cloud

The two questions illustrate one of the biggest challenges in understanding cloud computing; the reality that it has two very different capabilities. One is focused on the 'front office' and doing business with the external world which Capgemini calls 'outside-in' and business managers see as a revolution in terms of an entirely new set of opportunities. And the other is to enhance the operational capabilities of internal enterprise IT in supporting the 'back office' referred to as 'inside-out' which is an evolution of the current technologies.

These two models allow us to separate the different challenges that cloud computing can be used to address in any organization manufacturing products or delivering services:

■ **'Inside-out' – what to do with existing operations focusing largely on cost?** Businesses and public agencies deliver hundreds of applications, many of which have been designed and implemented in isolation – all with their own systems, and with significant investment. However, the activities of enterprise IT can be defined as 'inside-out' as they start from, and are focused on, activities 'inside' the enterprise and reach towards the outer edge defined by the firewall. The few activities requiring 'outside' access i.e. use of the Internet and Web, are managed on the 'inside' governance model of traditional IT. As the number and scope of 'outside' requirements from the business grow so do the number of 'issues'. Part of this is down to the 'outside' technologies of cloud, mobility, and big data being completely different to the 'inside' technologies which are built around using client-server to support a close-coupled, state-full, or data-centric, deterministic environment.

Some of the technologies taken from the full spectrum of cloud computing such as virtualization are understood and can be used to improve operating efficiency and cost of this traditional IT environment. This leads to the belief that clouds are an evolution of the existing IT model as it is used in the enterprise today.

Therefore the quick answer for IT organizations is: *'disaggregate, consolidate, and share'*.

■ **'Outside-in' – how to respond to change that is happening at the borders of, and outside, the organization?** Both the private and public sectors also face pressure from outside; from the changing shape of customer and citizen behavior and demands. 'Outside-in' is based on Internet-Web architecture characterized as loose-coupled, stateless and non-deterministic. In the 'outside-in' approach the relevant users and devices are moved outside the existing secure IT environment, and will co-exist together on a cloud that permits loose-coupled, stateless, consumption of 'services' supported from this shared cloud. The periodic need to access email, and a handful of enterprise applications can be handled with true thin clients working from 'outside-in', thus preventing the data, system, or application from being vulnerable in the same way as if these devices and users were working from 'inside-out' and requiring everything to be 'brought inside' the secure zone. This model can also accommodate customers bringing their own devices, agile business and other ways that the requirement for a new business model is expressed.

Managers in the business world believe that this is a game-changing revolution in the front office and alters how organizations engage with clients, customers and the public.

'Inside-Out': The evolution of IT systems

- Internally focused on back office transactions
- Reduce the capital and operating costs of existing systems
- Improve operational performance of technology and business
- Standardization and rationalization of estate to improve manageability
- Increase flexibility and agility to respond to change
- Reduce the cost of systems change to meet future requirements
- Refine cost allocation
- Create possibilities for sharing various elements as in 'X'aaS
- Often driven by the efficiency and effectiveness of IT systems (sometimes perceived as a "cost-saving" model)

The quick answer for organizations is: *'start small, be nimble, and remain innovative.'*

So, have we reached the game-changing moment that business managers want? Clearly the answer is yes, as clouds enable a revolutionary new approach to engaging with their markets, but equally the IT management is correct as certain technologies from the Cloud can be applied to traditional IT to reduce costs and improve operations in an evolutionary manner. So to summarize:

'Inside-out': Using cloud to help with the *'inside-out'* is an evolution of IT in the back office. It's about:

- Streamlining what is in place now
- Smooth migration, maintaining reliability and consistency
- Ensuring legacy integration 'spaghetti' is not simply migrated to the Cloud equivalent

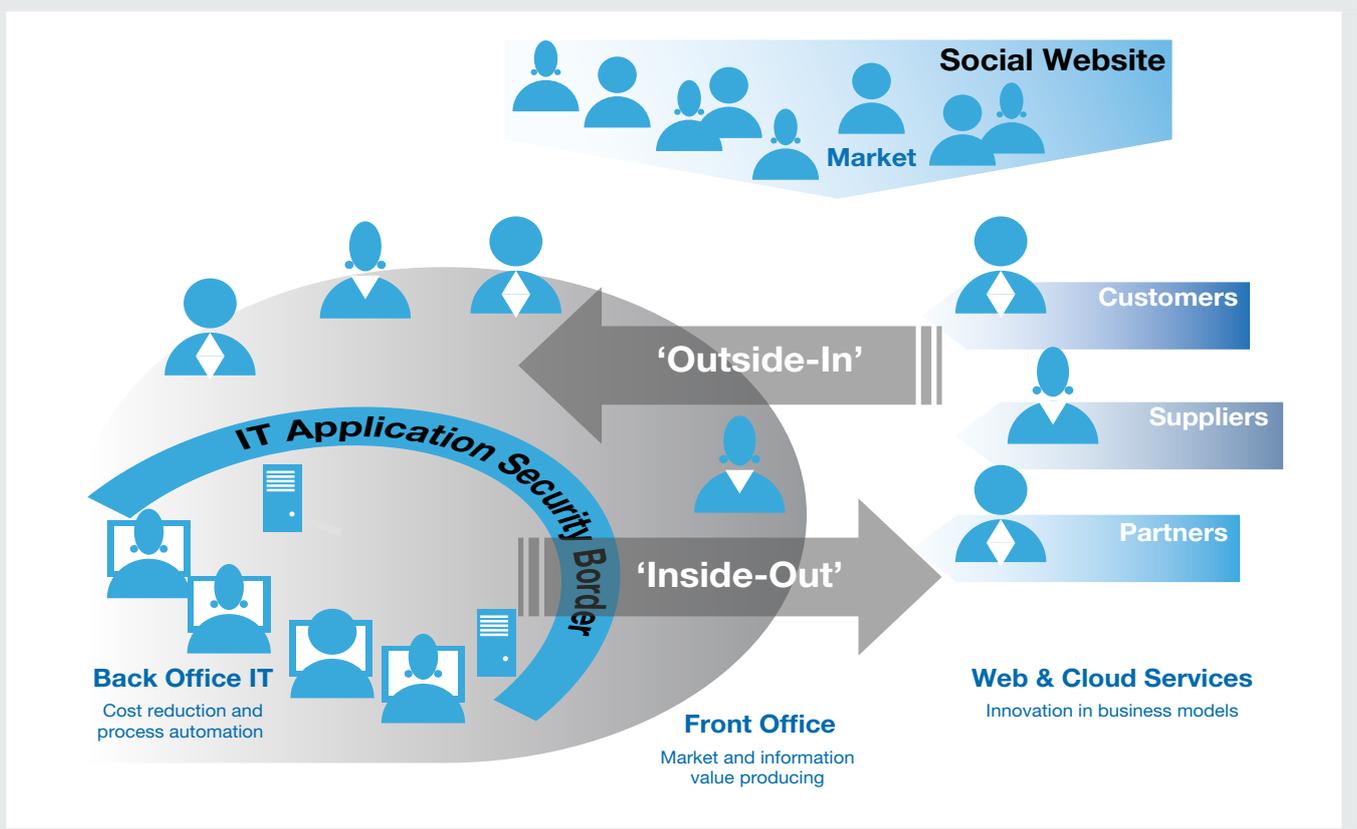
- Maintaining service levels within the same underlying process
- Moving through virtualization, consolidation (and potentially transformational outsourcing), to cloud
- Increasing the flexibility of legacy systems and reducing the cost of introducing changes.

An example of this evolutionary approach to existing systems can be seen in Capgemini's work with the Scottish pan-government procurement function.

'Outside-In': Using cloud to help with *'outside-in'* is a revolution in the front office. It's about:

- Embracing and innovating with new delivery models
- Engaging and enrolling the customer in the service delivery chain
- Responding to user demand, policy change, and customer behavior

'Inside-Out' versus 'Outside-In'



InnoEnergy

“We want to improve ‘connectedness’: making it easier to find, approach, understand, and connect with others. We are looking for persistent virtual environments, in which participants can create, organize and share information, as well as find, connect and interact with each other.”

Johan Torbjörnsson
CIO KIC InnoEnergy

InnoEnergy is a joint venture between a number of pan-European technology, energy and academic organizations.

The goal of InnoEnergy is to connect more than 1,500 energy scientists right across Europe in order to encourage innovation and bring new research and ideas to market to enable a climate-neutral Europe by 2050. In doing so, the aim is to help new SME businesses emerge. This requires levels of pan-EU collaboration that were not currently in place, and were not ICT-enabled. A cloud-based collaboration platform has recently been created to effectively connect this community.

‘Outside-In’: The revolution of business capabilities

- Externally focused on front office doing business in ‘the market’
- Shift the focus to customer-centric joined-up services
- Actively engage customers
- Reduce time, cost and complexity of providing all forms of services
- Reduce the cost of introducing innovative models
- Reduce cost-to-serve through new models that better fit with customers
- Pay only for the computational services needed when they are needed with automatic cost allocation
- Improve customer engagement in pursuit of better outcomes
- Integrate with social and business networking to improve outcomes
- Driven by the service and the business (perceived as “business efficiency”)

- Enabling integrated services that meet the customer’s desire to experience joined-up services that make sense to them rather than on the enterprise’s internal organization
- Enabling the blending of enterprise services with social networks or other private services
- Being agile in creating new solutions using cloud
- Composing services from available cloud elements.

An example of a new service created out of cloud-based components in an agile way is the **InnoEnergy** collaboration platform. InnoEnergy’s goal is to support the generation and commercialization of innovations created by a large internationally-based community of scientific researchers on sustainable energy systems across Europe. This

cloud-hosted platform allows the community to connect and collaborate in pursuit of its goal to achieve climate neutrality by 2050.

These two models – ‘*inside-out*’ and ‘*outside-in*’ – operate in tandem, each addressing a different set of challenges, each using cloud technology, but in fundamentally different ways. Confusion between these two very different aspects lies at the heart of ‘cloud confusion’ and is frequently reinforced by technology vendors pushing their products rather than business solutions.

eProcurement Scotland

Evolution or Revolution?

Launched in 2002, eProcurement Scotland (ePS) is, in essence, a private cloud.

Over time ePS has evolved into a scalable, 'as-a-service', multi-tenant and partially pay-per-consumption system. As a result it displays all of the five NIST cloud characteristics; indeed it was a cloud before the term was widely used.

The ePS platform now processes more than £3.6bn per year, representing about one third of total public procurement spend. According to Audit Scotland, the system generated annual savings of £454m in 2008/9. Over 1.6 million transactions go through the system annually, and it is used by over 65,000 registered users and more than 93,000 suppliers.

This cloud platform has enabled ePS to take an evolutionary approach to replacing existing procurement arrangements. The idea of ePS was revolutionary in the way it reconfigured existing practice, but wisely it did not demand an instant revolution for all of the Scottish public sector.

The challenge is to work out how to use both cloud perspectives in the right context

It's true that the private and public sectors each cover an extraordinarily wide range of services. So each organization will need to tailor its approach to cloud to get the most out of the opportunities it presents.

To benefit from cloud, an organization will need to look at how both of the above approaches apply to their circumstances. Maximizing the benefits requires taking a holistic view across all the functions of the organization, and perhaps those of other companies, agencies and partners. This may involve providing simpler access to services for customers over a shared platform, embracing social media tools as part of the set-up. On the other hand it might support a supply net in a complex manufacturing industry stretching from a shared environment for common data and processes. It could, in government, involve providing one version of common processes (like payments) across agencies, or consolidating many of the common corporate functions and systems into one cloud-provisioned service orchestration platform.

Cloud has the potential to impact the widest possible range of functions and services. It offers a potentially radical approach to transforming the way in which organizations operate. But notice the use of the terms 'access to services' and 'common data', representing the two other technologies that align with clouds, primarily in the 'outside-in' model representing 'mobility' of people and devices to access the 'big data' of the common shared environment. This is in contrast with the fixed nature of the desktop model and internal database of 'inside-out' where even a notebook PC is still managed and provisioned as if it were a fixed desktop inside the firewall. Equally, the term 'big data' in 'inside-out' tends to mean the ability to make available more computing power to analyze existing internal data in more depth. By contrast, think of the ubiquitous Apple iPad which can connect anywhere, at any time, by wireless, and consumes 'apps' from the Apple Cloud as an example of 'outside-in'. The huge amount of data that makes up the Web is, of course, the basis of the term 'big data'.

eProcurement Scotland illustrates how organizations can realize significant benefits by taking a multi-agency approach. This procurement solution is used by a huge range of Scottish public bodies, from council offices to hospitals and school kitchens. While public bodies in

Government Cloud Strategy

Governments are already working actively to understand how cloud will change their context at a high level.

Capgemini continues to work at the forefront of cloud strategy development with a number of governments including the UK, Netherlands and the US, as well as with the European Commission.

Scotland are strongly encouraged to use the system, it is not enforced top down. Instead, the system is used based on its effectiveness. This evolutionary approach has only been possible because the platform was set up with an awareness of the entire Scottish public sector ecosystem and the appreciation that not all agencies would use it from the start.

Governance, Security and Mobility

It is this point, with the understanding of the previous sections in terms of both the roles of clouds and the basic technology, that we should address the most fundamental and troubling aspect of clouds in many people's minds, security. Once again this falls into two different challenges: the internally focused world of traditional IT concerned about moving enterprise applications and therefore enterprise data outside the enterprise firewall to be run in an external facility 'as a service'; and a very different challenge about supporting people using mobility devices externally for new business requirements.

Once again the difference between 'inside-out' and 'outside-in' business activities and the enabling technologies has a profound effect on the solution. The matter of moving enterprise data onto external service centers can be risk assessed with methods that are little more than a variation of existing techniques, but the rapid growth in external mobility around people using a wide variety of devices connected by wireless is a very different issue. It's back to the question posed at the beginning of this paper: 'Do business users buy Apple iPads to use internal enterprise IT better, or to escape the limitations in order to use new services and do new things?'

Business people with iPads, smartphones or Android tablets are not looking to connect to, and use, the existing enterprise applications, except for email and maybe a couple of other specific applications.



Instead they want to participate in external communities, use the Web in its broadest sense for real-time information, and consume selected services from 'App Shops', at least, and an increasing percentage move to generate completely new business activities hosted on clouds from Amazon, Google, and others. These activities focus on interaction with, and between, 'people, events and real-time data' to use a common phrase often associated with the topics of mobility, clouds and big data.

Most importantly, these activities can be summarized as centered outside the enterprise, outside the firewall, and outside the traditional enterprise application technology of IT, with only a very few activities at all requiring to connect 'inside' the enterprise. The primary focus and value comes from external or activities 'outside' the enterprise and there is a limited secondary need around connecting 'inside' the enterprise to a handful of services such as email. An additional point is that the user might be mobile or traveling outside the enterprise,

such as a sales person, or service engineer, and using a wider range of devices, so the term 'mobility' is being used to define any device that does not have a 'fixed', usually wired, connection service to the IT-managed corporate network. All of which is further underlined by the differences, which are indeed so critical a point that we will state them again.

Furthermore, there are differences between the technologies and architectures used internally and externally. Using the definition of 'inside-out' the model of traditional IT is around monolithic enterprise applications using client-server to support a close-coupled, state-full, or data-centric, deterministic environment whereas the 'outside-in' is based on Internet-Web architecture characterized as loose-coupled, stateless and non-deterministic. Each and every important technology characteristic is exactly reversed, as is the purpose that the business user, or manager, wants to make of it. Little wonder the security and governance risks seem daunting when we try to apply conventional 'inside-out' IT security to the new 'outside-in' world.

Pushing the boundaries of the internal IT world

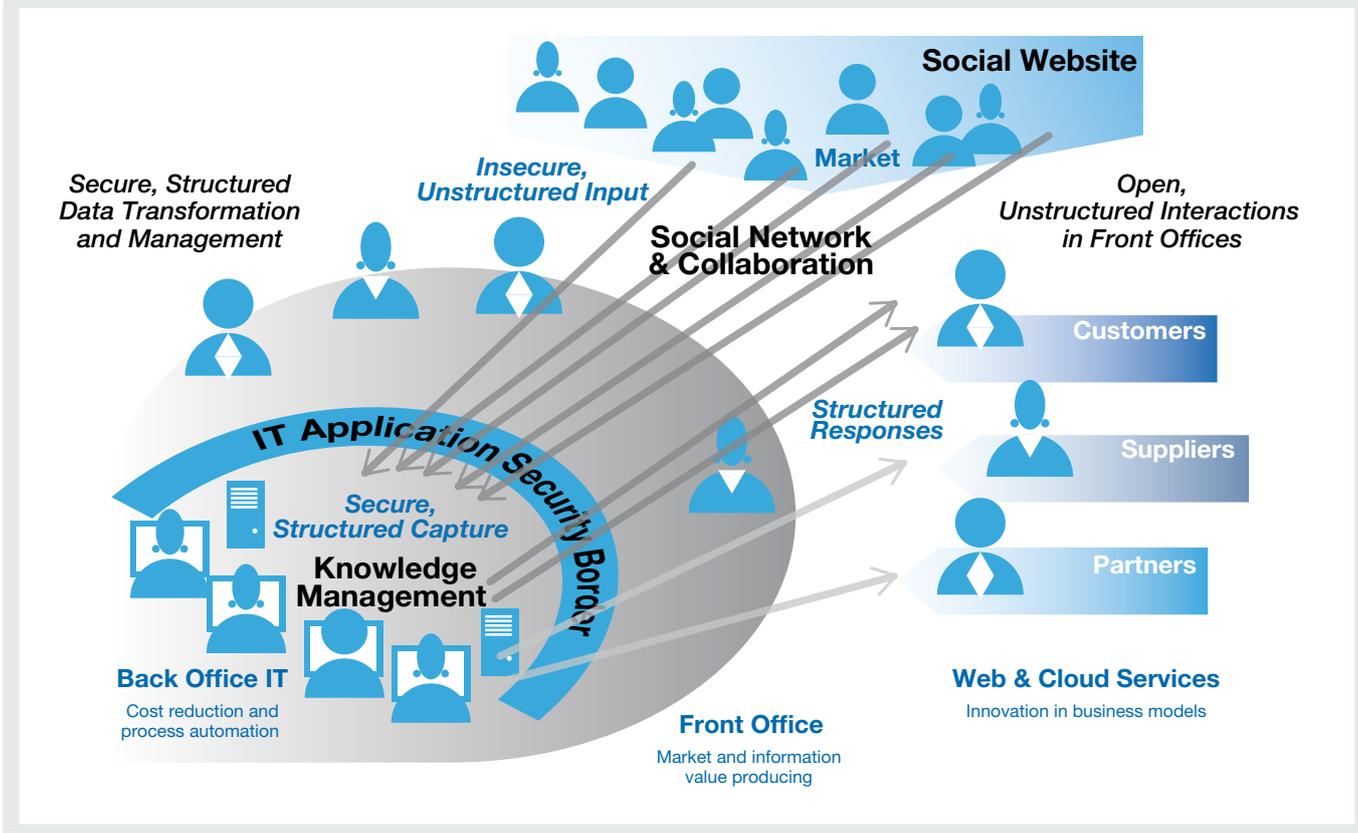
The first wave of mobile solutions provided an extension to the internal IT world of applications for remote working, e.g. at home, on the enterprise applications and data by effectively extending the firewall to include the remote PC using a Virtual Private Network, VPN, connection, and by ensuring that the PC was 'locked down' to ensure the internal IT governance was maintained. Locked-down enterprise PCs used in this manner support 'inside-out' working practices, and continue to control and limit the users' ability to participate in the unstructured external world of tools, sites and services that form the online external world. The new wave of mobility driven by the users' 'bring your own', BYO, devices is specifically designed to overcome the limitations of this approach in terms of external access and technology.

This is an understandable governance requirement to secure and protect the systems and data of the enterprise that should be safely protected within the firewall, and for back office workers requiring access to enterprise IT it is a correct solution. But for front office and mobile workers whose focus and area of activities is external and online it is a severe and often unworkable solution leading them to choose to use their own devices with suitable configuration for the outside-in environment of their working environment.

Actually it is the very differences that support the solution to these challenges: the new technologies of mobility, big data and clouds are about enabling and supporting the 'outside-in' users without infringing the enterprise security model. To do this, however, means moving them outside the enterprise firewall and thereby removing the risk of enterprise data being accessed externally, or needing to allow other users from different enterprises to pass through your enterprise firewall.

In adopting an 'outside-in' approach the relevant users and devices are moved outside the existing secure enterprise IT environment to co-exist together using clouds to provide the loose-coupled, stateless consumption of 'services' on demand that are at the heart of this new environment. Office services such as word processing, spreadsheets etc. can be provided as on demand services from clouds such as Microsoft Office 365, and even necessary elements of ERP can be similarly provided by SAP Business OnDemand or similar services. And for custom services and social CRM, Salesforce.com extends the capability to include development and deployment services. This model can also accommodate customers, suppliers, collaborators, and employees wanting to 'bring your own' devices, agile business on innovative business models and all the other ways that business is looking to work externally to create new value.

Understand the Differences Between Secure, Structured IT and Web Working



'Outside-in' is a completely different way of thinking about the requirement, delivery and deployment model, but given that this is a completely new generation of technologies with nothing in common with the principle enterprise IT applications, that are being used in a completely different way by business, this should be expected. After all, the last big shift to using PC Network technology changed every aspect of the Mini Computer requirement, delivery and deployment model in the early 1990s to the model we understand today as enterprise IT. This is the cloud computing revolution that business managers see and are pressing ahead to adopt as they can literally bypass the IT function if they choose.

The real challenge that underlies the success of an enterprise in adopting 'outside-in' is to understand how to define, build and operate

the gateways between 'outside-in' and 'inside-out' to ensure that the enterprise gains cohesive leverage in all its activities. This is more likely to be achieved successfully by the enterprise IT side understanding exactly what is required from their tightly regulated side, but at the same time they must take good care to ensure that they don't 'lock down' and use inappropriate governance on the 'outside-in' users and activities.

A Real Example: Digital Transformation

The operating authority of a major airport is facing demands to improve the operational management of its increasingly congested airport, both to improve real-time efficiency in the face of the increasing number of unplanned events (late arriving aircraft, lost baggage, etc), and the expectations of passengers and airlines that information flows will be provided both in a more timely way and in different people-oriented formats, or feeds. Already in the airline industry, there have been several announcements of airlines individually deploying large numbers of tablets or smartphones to improve ‘operating efficiency’ to frontline staff. In plain language this means using mobility to allow staff to deal with the many unplanned events, from missing passengers to lost luggage, finding the passenger steps to replenishing food and drink, etc. for a last-minute change in the gate an aircraft arrives at etc.

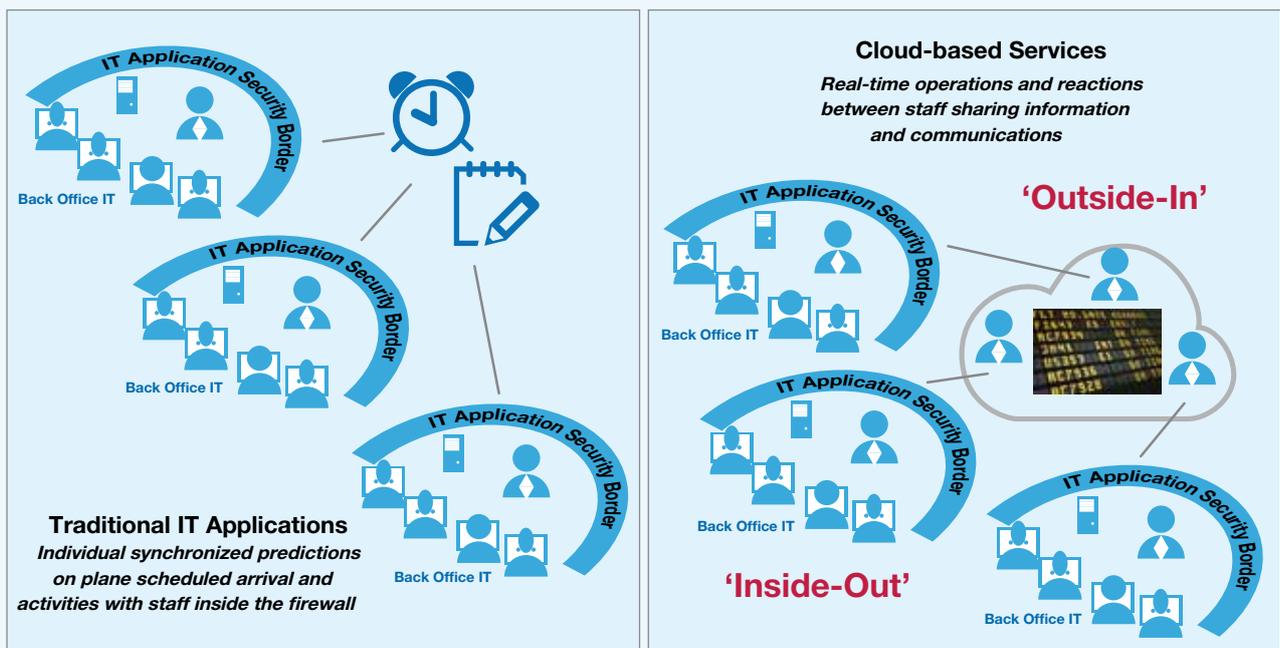
The existing, and traditional ‘inside-out’ IT systems of all the various members of an airport ecosystem – airport operator,

airlines, baggage handler, food services, etc., etc., – will show each separately their individual enterprise’s planned activity from their secure and closed enterprise IT. In each enterprise the data comes from the central ERP systems out to the edge of the enterprise in the form of structured non real-time information to show what should happen, and if it does happen then the whole ecosystem will be synchronized and ‘resource planning’ will have succeeded. Deploying mobility based on existing enterprise applications may allow more freedom to permit staff to work away from fixed desks, but still limits the information to the supposed ‘schedule’ of activity.

The operational improvement challenge that needs to be addressed is that in the ‘real’ world a series of unforeseen events occur that, to be solved, require the staff of the companies involved to be notified of each event and to be able to interact together to solve each event in an optimal way. The better any business can do this the higher their customer

satisfaction and most likely the lower their costs through optimizing their responses. However, to do so is both a highly people-centric – using real-time data ending in a ‘work around’ – solution, or process, to suit the circumstances, and a shift in the technology or IT model. This is where the crucial difference between ‘inside-out’ enterprise IT, with its governance and security needs and using a new business and technology model based on clouds, mobility and big data to enable ‘outside-in’, provides the answer.

Shifting the ‘on tarmac’ front office operational staff outside the firewall and supporting them on a common shared cloud with the other members of their working ecosystem (shown in the diagram around servicing the aircraft on the ramp between flights) creates a revolutionary improvement in operational capability in their prime function. The individual enterprise employees are now able to function as a collaborative team sharing information, communicating, planning and organizing in real-time



using information and data that is not part of their enterprise internal IT systems, and therefore bypassing the necessary restrictions imposed by 'inside-out' traditional IT. Neither does this approach require any of the people involved to be present in each other's existing enterprise IT systems, the current barrier to addressing this kind of transformation.

There is still a need for those working 'outside-in' to handle the 'in' part even if it is a secondary focus, for instance to see what was planned to happen for comparison purposes, or to update records on what has been the final outcome. This does not necessarily mean providing a full enterprise application on their machine with the corresponding concerns of access and security; instead it means the adoption of thin client models working solely in the presentation layer of the browser. Browser-based 'representation' of data avoids the issues concerning moving enterprise data outside the enterprise and placing it at risk.

'Outside-in' workers are free to use new sources of information from the cloud/big data environment too, such as the very successful iFly app. iFly can be loaded onto a smartphone or tablet and, on initiating, connects to the iFly cloud service, which in real-time orchestrates the unstructured information on any particular flight and answers queries that airline staff are unable to answer through their own internal IT systems. There are many stories of passengers using iFly to inform airline staff of the status of their own aircraft and flights at chaotic times such as winter storms creating havoc with the planned schedules.

Cloud is much more than just technology

The 'outside-in' cloud has an impact well beyond the narrow confines of technology. Cloud services are part of the Internet-Web model, indeed this is where the key technologies come from, and have embedded themselves in the everyday business and personal lives of literally a world of users. Services like Google Search are such an intrinsic part of everyday life that it is hard to imagine a part of life they don't affect in some way, or what we did before they existed.

To work out how to make best use of cloud we need to take a holistic view. Only by looking across the full spectrum of environmental conditions is it possible to make the right judgments about an organization's cloud adoption strategy. It changes the user proposition; legal conditions and risk exposure differ; policies may need to be altered or created; working practices will change (for instance aligning financial or HR processes with other organizations in order to use similar cloud-provisioned processes); assets convert from capital to operating legers; the whole economic basis can change from 'own' to 'pay as you consume'.

Planning for the impact of cloud across all these areas does not imply that this impact will come instantaneously or that the adoption of cloud needs to come all at once. The technical migration will vary by area and may take years in some areas, yet happen overnight in others. In particular, '*inside-out*' and '*outside-in*' have very different value propositions and timescales. However, in planning for all the specific actions it is important to step back and consider the bigger picture.

A cloud strategy is *far more* than a technical strategy, it is a strategy for the transformation of the entire enterprise, hence the increasing usage of the term 'digital transformation' of business. It involves business people in new roles demanding a revolution in business capabilities as well as the existing people and roles looking to carry out the ongoing evolution of operating efficiency. And in turn that demands new development techniques and methods that match the new expectations as well as delivering the existing applications for less.

The Six Key Roles Using Technology

Cloud value comes about through bringing *business* and *technology* together, to address both ‘inside-out’ and ‘outside-in’ potential.

It is thus imperative to consider the different types of internal users and stakeholders. We have grouped them into a set of six generic role types, each with their own needs, views and challenges. Three roles represent the ‘front office’ who want to exploit the ‘outside-in’ revolution in business capabilities and three ‘back office’ who are concerned with evolutionary improvement using ‘inside-out’ technology improvements.

Driving the ‘*outside-in*’ business ‘digital transformation’ are the:

1. **CEO** – The CEO seeks new markets and business streams to grow revenues and increase profits based on innovative business models to find and ‘service’ their existing and new customers.
2. **Business Users and Managers** – A new generation of digital-savvy users and their managers are importing their knowledge and expectations in the use of Web-based ‘services’ on a wide variety of devices into their roles. These people have already started to exploit cloud-based services, adopted their own mobility devices, and are making use of the big data available externally. They will drive the enterprise into new and profitable exploitations.
3. “**Chief Innovation Officer**” – While the job has many different titles, most organizations have smaller groups trying to find new and innovative ways of delivering for customers. These small groups have distinctive application and IT needs. They are, in essence, inventing the future – and thus at times are cannibalizing the present. However, such behavior can ultimately damage the enterprise as it will lack cohesion in its efforts

to exploit breakthroughs and a key role of the Chief Innovation Officer is to ‘manage’ the innovation into a coherent digital transformation.

The back office is the home of traditional centralized IT and needs to use ‘*inside-out*’ cloud technologies to address the challenges of the:

4. **CFO** – The financial functions are concerned with ensuring continued compliance and keeping a tight rein on IT projects that could have expensive or unforeseen outcomes. At present, budget cuts are the dominant item on the CFO agenda so consolidation and sharing of resources is an attractive consideration.
5. **CIO** – The traditional IT function is responsible for ensuring the consistent delivery of critical IT services. Currently the CIO is under pressure to deliver significant savings to help control budgets and needs to find a significant new way to address this in the already tightly managed IT operations.
6. **Corporate Services** – Another role that has different titles but a common objective of looking at ways to ‘outsource’ whatever is a non-differentiating corporate service. This can range from traditional operations outsourcing to more specialist elements such as hardware operations, core functions such as email, or even business processes such as invoicing and HR that can use shared cloud-based services. New procurement functions and capabilities will develop within this role to manage the new tasks associated with cloud deployment.

The views, needs and concerns of these different perspectives must all be considered and built into a cloud strategy. And they are all users of business applications and technologies, albeit in different ways and to different extents. We

must understand how to map one to the other. As an example, if front office staff are moved outside the firewall into the ‘outside-in’ environment then services such as office automation tools will need to be provisioned accordingly i.e. shifting from Enterprise Microsoft Office to online Microsoft Office 365, which is optimized for mobility clients, and permits data sharing and collaboration on a cloud.

Developing and deploying applications and services

Understanding the difference between ‘inside-out’ with its monolithic applications deployed through client-server, and ‘outside-in’ with its masses of constantly changing services consumed from clouds leads to the understanding that several different types of software development and deployment during different lifecycles will be needed alongside flexible, robust and well-managed operations.

TechnoVision, the Capgemini methodology for aligning the development of technologies with their impact on business, addressed this through a simple metaphor based on four different modes of transport and a hub to better understand five different styles of applications and services that are recognizable:

1. The **TRAIN** is a stable, robust mode of mass transportation. It is not flexible but reaches its goal in a predictable, straightforward way. It is based on an infrastructure that is designed and built to last for decades, and everybody who uses that train travels in the same way from A to B. The functionality is provided in a highly efficient and standardized way. Many people will be affected when trains do not run. The train is akin to ‘inside-out’ IT because trains depend on their own infrastructure being built and operated solely for their benefit as an overhead.

Example: The internal ERP system of a large process-centric department

Development & Deployment

		System environments	SAAS solutions	Methodology	Acceleration centers	Factories	Pricing
<p>Personalize An individual's capability to choose their 'tools' and how they wish to 'interact' and 'collaborate'</p>	SCOOTER	Apps BOBJ	Business Explorer Roambi AppStore	SCRUM Rapid Design & Visualization	Rapid Innovation Workshop	BI Reports Apps Factories	Per Report Per App Menu Card
<p>Differentiate A Manager's capability to build locally unique 'differentiating' capabilities both externally and internally to create revenue</p>	CAR	NetWeaver BPM Cordys Duet Enterprise SharePoint 2010	Cordys BPM	SCRUM Rapid Design & Visualization	Rapid Innovation Workshop Rapid Solution Workshop	BPM Services	As a service Per functionpoint Menu Card
<p>Core Competences Common, shared core processes that support each differentiated offer above, and connect to transactional IT applications below</p>	HUB	NetWeaver Sybase	Force.com Business ByDesign	Common Reference Architecture (CORA)	Rapid Solution Workshop	PI Factory	Price per interface As a service
<p>Comply (ERP, etc.) Traditional Enterprise Applications with organized procedures and data integrity, keeping compliant business results</p>	BUS	CRM SRM	Sales on Demand Salesforce.com	Deliver Rapid Design & Visualization SCRUM	Rapid Solution Workshop	BI (Cubus)	As a Service Menu Card Fixed Price
	TRAIN	ERP	Business ByDesign	Deliver	Rapid Solution Workshop	Remote Design & Configuration	As a Service Menu Card Fixed Price

would be a good example of this type of high reliability application.

2. The **SCOOTER** by contrast represents the complete alternative being a lightweight, extremely flexible, individual and very personal method of transport. The infrastructure for the scooter, both roads and parking, is already in place as a public utility just like the Internet and Web. It can be used for the “last mile,” bringing you to places even cars cannot reach. In crowded areas, scooters are faster than any other means of transport. It is easy to rent a scooter – just for a day or so – and explore parts of the city in a flexible, cost-effective way. *Example: An example of this lightweight, flexible approach would be a knowledge worker utilizing a collection of services in a personal ‘mash up’ to achieve high personal value almost certainly in the external world of ‘outside-in’.*

3. The **CAR** is also an agile means of transport but unlike the scooter it will support a group of people with a common destination again using the public infrastructure. There are many different types of cars, and their owners can configure and adapt them to reflect the aspects of their particular likes and dislikes or requirements. *Example: A workgroup tasked with the development and support of a new product offering which is both a short-term task and requires active access to and participation within the external world.*

4. The **BUS** is also a relatively stable mode of mass transportation, but clearly with more flexibility. A bus can take a detour if circumstances require, and it can be used for alternative purposes on top of the fixed schedule. Moreover, it usually connects directly with the train system. Buses can be used as both public and private vehicles, i.e.

Three key actions from today

1. Appoint a leader for cloud – Or one for **‘inside-out’** and one for **‘outside-in’**
2. Set out a strategic roadmap – Involving business and technology
3. Select a place to pilot cloud

'outside-in' and 'inside-out', in both cases offering an effective way for a larger group of people to gain the benefits of traveling together to a common destination.

Example: A departmental service for providing a focused application internally, or externally a shared services provision for a similarly focused activity such as a marketing service.

5. All of these modes of transport are tied together through a **HUB**, best seen as a modern town center venue where trains, buses, cars and scooters can all conveniently "dock" and people can easily integrate their means of transport, while benefiting from a host of add-on services.

Example: A HUB service would enable all the individual

applications described above to co-exist and co-ordinate with each other. For example, it enables data to pass from an employee's profile to a company's payroll system to ERP, or a job seeker's profile to benefits payments to ERP.

A good cloud approach combined with existing IT supports the matrix of roles, applications and services to be found across an enterprise. Getting to this position, however, means appreciating the full impact and devising a strategic set of goals against which to deliver immediate tactical demands. In particular it means recognizing the differences between 'inside-out' and 'outside-in' as environments for governance, delivery and deployment methods alongside understanding the benefits of a well-designed services integration strategy.



A Roadmap for Cloud

“All good in theory – so how to turn it into reality?” That is the question that so many business managers and public administration leaders are asking. The temptation to delay should be resisted for two simple reasons:

- Those that are in the vanguard of this initiative – and who are tackling it competently – will benefit earliest. With the potential for very substantial savings (it is not unusual to show a business case with savings of around 25%¹), they will remain in financially far healthier positions. And thus they will be able to service their core role far better.
- Change will continue regardless and it risks engulfing those companies and public administrations that resist, particularly with reference to the ‘outside-in’ model. You only have to look at the extent to which everyday people are taking things into their own hands, individually and collectively. For example, people (including corporate executives, public servants and politicians) are using social networks like Facebook to comment on and find out about company and government services. Both businesses and governments need a strategy to take advantage of the opportunities this offers for getting customer feedback and informing their customers, potential customers and the public. Without this strategy such social media will become an unmanaged source of false information and aggressive criticism, but, with an effective digital transformation program, existing corporations will be able to leverage new customer opportunities leading to increasing competitiveness. And in the tough, global markets of today, finding new ways to differentiate and secure customers is a critical success factor.

Recognizing that this involves a mindset change as much as it does any other, Capgemini believes that a leadership community needs to come together collectively. This community may also include customers, suppliers, and partners who share a mutual interest in transforming an aspect of a market place, such as the example given earlier around an Airport Operating Authority. This community should re-evaluate the context, share views and concerns, and re-set the context within which its operations and services will work. This then creates a basis for making specific decisions about particular initiatives.

Crucially, approaching this in the traditional manner with “boards, chairs, and briefing papers” is not as effective as taking a far more engaging visual and story-telling (use case) approach. To that end Capgemini has developed an outline framework (see note below) for the “Journey to Cloud in the Public Sector”. It will:

- **Accelerate** the awareness building, learning, and decision making for an organization or group of agencies
- **Personalize** generic, internationally relevant private or public sector material and make it specific, relevant and meaningful
- Enable the business and its constituent services to be broken down into manageable components; allow the evaluation of options and priorities to take place; and **support decision making** to phase the reconstitution of services in potentially different (cloud) models, with potentially different partners
- Provide a framework for **learning**, and **leading practice** sharing, between a corporation’s subsidiaries or public agencies.

Cloud is here. The technology has matured at an exceptionally challenging time for companies and public administrations. How they choose to use it will help determine how successfully they address these challenges in the years to come.

¹ For instance, Capgemini’s “Messaging as a Service” solution offers its customers a 50% overall cost reduction in the (client-generated) business case.

A Brief Technology Overview of Clouds, Mobility, and Big Data

Clouds: a simple explanation

The topic of clouds has been a recognizable part of the debate on how to improve business using technology for more than two years now, ample time for clarification on the topic and identification of the core issues and benefits. Yet if anything it has become less understandable with the passage of time, as the hype cycle attempts to remake almost any product or technique as a new technology to be considered under the 'cloud' label.

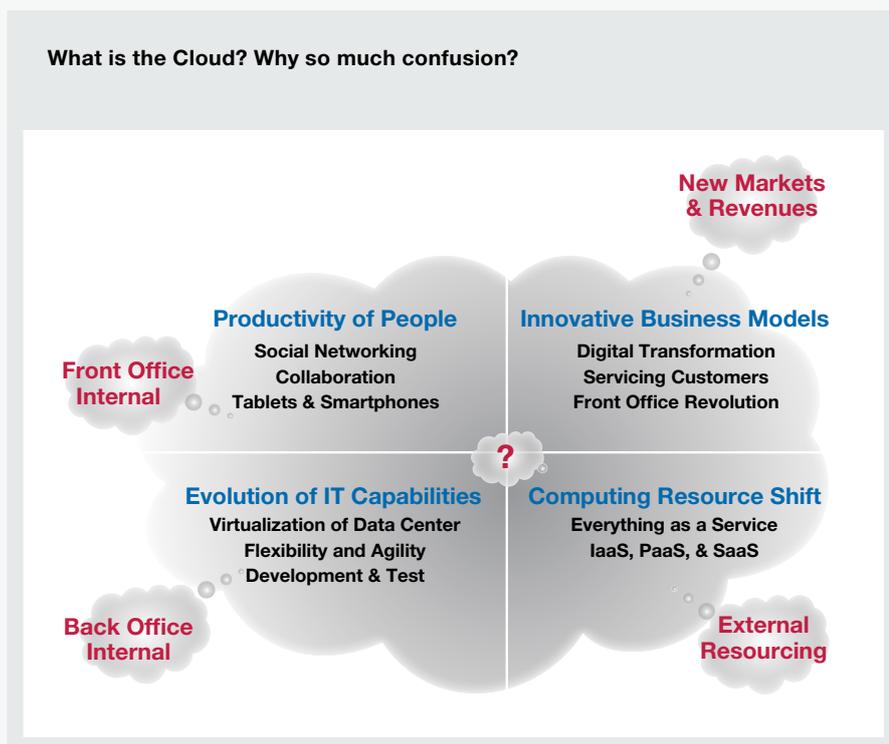
Here's a simple technology roadmap building up a series of changes starting with the advent of the Internet and the browser into popular use in the early 1990s:

1. **The Internet:** started a profound change by using standards to provide a simple, yet effective, universal **connectivity** capability that allowed anyone and anything to be contacted as and when needed without predetermined planning and implementation of special faculties.

2. **The Web:** or what we might look back on as Web 1.0, followed this by providing browser technology for the universal management of **content**, a real game-changing moment in terms of technology standardization suddenly offering real tangible benefit, and changing how companies could participate in the external marketplace by building Websites.
3. **Web 2.0:** more recently added a new range of technologies and capabilities around the ability of **people** to interact, and share in a new range of so called 'social' activities, so named because the universal social model created an equally radical game-change that put people at the center rather than applications, data or computers.
4. **Cloud Services:** is the latest stage of this progression adding the much-needed ability to deliver **processes**, as universally accessible services delivered in a standardized manner from servers in a cloud data center with a payment model based on use and an operating model based on simplicity in build, and flexibility in changing the orchestration of any process.

Just reflect for a moment on the importance of this last point and consider how difficult it is currently to achieve processes by using the content model to create forms. As social CRM continues the transformation of business models around 'servicing' customers, and marketplaces better, by matching customer demands and responding to events in optimized ways, the importance of an effective process model to manage the cycle from initial interest to placing an order is clear.

But quite how does this translate into the term 'clouds'? Strangely enough it is simple. The above four technology steps are all based on using a technology model that is described as 'loose-coupled, stateless and non-deterministic'.



In contrast, traditional enterprise IT applications are integrated in a manner described as 'tight-coupled, state-full and deterministic' allowing enterprise architecture to draw diagrams which show exactly what is connected to what and for what purpose. With the new technologies in a loose-coupled model there are no permanent connections so it's not possible to draw up an enterprise architecture diagram in the same way. The only possibility is to show which users and devices are part of the same ecosystem, then represented by a drawing of a cloud.

It therefore follows that by definition anything based on the standard client-server tight-coupled model cannot truly be defined as a cloud as it will not exhibit loose-coupled architecture! But some of the key technologies that make up the total technology model of the Cloud can be applied individually. Virtualization in particular can be used highly effectively to improve the operating efficiencies of existing data centers. This is a sensible and highly recommended approach, but a virtualized server running applications is not able to host 'services' and act as a cloud server without an additional specialized layer. This layer should conform to standards and practices such as the Open Data Center Alliance to allow 'services' to be hosted and orchestrated with those of other businesses, or government departments, in the same manner as Web servers are standardized to facilitate content access and 'mashups'.

We can break the technologies down into four groups as shown in 'What is the Cloud? Why so much confusion?' but in time these will become integrated into a cohesive set of capabilities as shown in 'Integrated Enterprise Cloud Computing'.

Mobility

The first generation of 'mobile' solutions supported the delivery of enterprise applications from

inside the firewall onto an external device with the technology focused on overcoming the need to accommodate periodic connection and disconnection. As such a key part of their functionality was to be able to take and store data in a cache in the external device leading to concern over the security of the device itself. This classic example of the 'inside-out' model of traditional IT led to applying internal governance to the first generation of external devices such as 'locked down' laptops with encrypted drives. This practice has continued even as a second generation of more sophisticated devices – led by smartphones and tablets – has led to a change in what and how users work. These devices and their users are severely compromised in their functionality by these practices because they do not belong to the 'inside-out' world of traditional IT, but the now 'outside-in' world of the Web and clouds.

The term 'mobility' is associated with devices that are able to function beyond the governance and delivery of 'inside-out' enterprise applications, and are able to make use of all types of Web-based capabilities including cloud services in an 'outside-in' manner. For these devices, and the people using them, the external focus is predominantly on doing business with others, and using external information from the Web. As the architectural model is loose-coupled, (hence the 'mobility' between all resources), stateless and non-deterministic with browsers as a key delivery element it is also thin client and requires hosting of its services and data. The Cloud satisfies this requirement and indeed enables the whole model of 'mobility'-based as applied to 'outside-in'.

The term 'stateless' means that there is not a data model in the sense of the client-server application environment, but rather there is what is referred to as a 'Representation of State, usually called 'RESTful' whereby a browser displays a screen

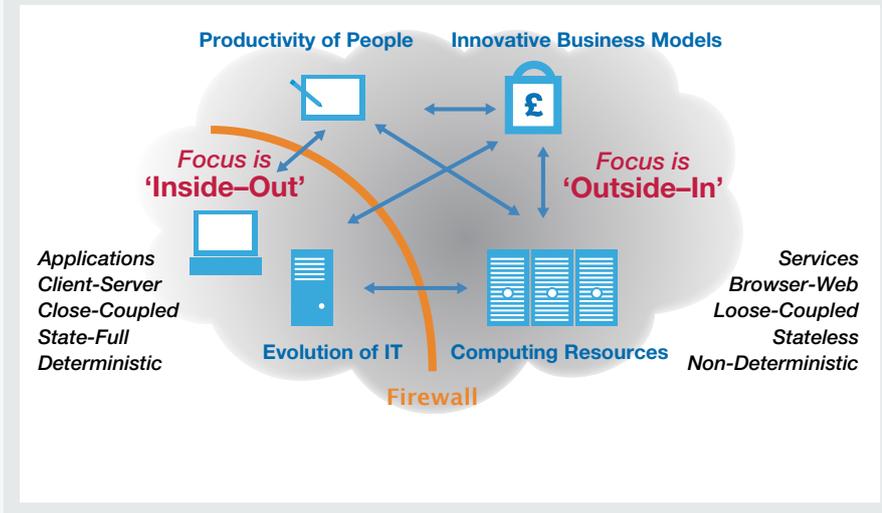
presentation sent to it by a Web server if it is content, or by a cloud server if it is a set of services. As a practical example consider Apple, its App Shop and its iCloud. The Apple App Shop holds the 'services' or 'apps' that a user can choose to use and provides the authentication for their use, a download provides the enabling service element, but in apps such as iFly all the data or information is supplied as a real-time connection under REST. In the case of a banking app this is a very secure method of separating the user in the 'outside-in' environment from access to the secure traditional IT applications, data and systems housed in the 'inside-out' environment.

A user's data is held on Apple iCloud in the form of cloud storage and can be accessed by any of the user's devices; PC, iPad, iPhone, or iPod that possess the authentication key thus ensuring that all activities are perfectly synchronized at all times. This is in very direct contrast to the older form of mobile client-server application, and its requirement for an extensive and complicated synchronization to maintain 'state-full' data. As such, the Cloud and mobility are inherently part of the same architectural model, and that leads to the third part of the model around 'unstructured' data, often referred to as big data.

Big Data

Client-server and its applications are data-centric and as the data held is directly associated with the applications that use it via tight coupling it is referred to as 'structured' and held in relational databases. Various forms of storage have been developed to handle the huge amounts of data an enterprise processes in its daily transactions and mounts up over the year(s), with data warehouses and data marts, online and offline storage all playing their parts. At the same time techniques for quantifying the data, Master Data Management, or analyzing particularly large

Integrated Enterprise Cloud Computing



amounts of data via methodologies such as 'Cubes' have been used. However, at the end two problems remain: querying data outside its structured format optimized for the application is slow; and it takes a lot of computational power.

In the traditional IT environment of 'inside-out' the term 'big data' is taken to mean the ability to use the technologies of the Cloud to provide mass computational power for these problems at lower prices resulting in an ability to gain more insights through more intensive analytical programs. Alternatively it may mean using lower cost hosted storage systems paid for by use as a cost-effective alternative to an enterprise owning all its own storage. However, once again in the Cloud environment of 'outside-in' there is a different meaning and indeed a totally different set of technologies and methods.

The data or content to be found on the Web is referred to as 'unstructured' as there is no uniform set of definitions, hence the interest in 'semantic' data where the data describes itself, or sector groups agreeing terminology, but the sheer scale of the available data and the power of search engines has meant that being able to make relevant contextual connections at the right time from all this 'big data', usually called 'real-time decision support', is seen as the new breakthrough in Business Intelligence.

However, collecting, storing and holding this data for analysis with new forms and techniques at the very high speeds necessary for 'real-time' decision support means a different type of database is needed, one that accepts 'unstructured' data and can support random queries. This has led to the development of NoSQL databases such as Hadoop and the

beginnings of a new query language called UnStructured Query Language, or UnSQL, to distinguish it from Structured Query Language, or SQL, as used with relational databases and structured data. Supporting cloud services, and mobility devices working in the external marketplace of 'outside-in' surrounded with literally a world of data means using appropriate big data methods to suit.

NoSQL is described as possessing Basically Available Soft state, Eventually consistent, BASE, in contrast to relational databases that are described as Atomicity, Consistency, Isolation, Durability, or ACID, and have the ability to scale to remarkable levels. Hadoop was designed from the start to be a fully distributed architecture drawing on the Google experiences with MapReduce, which was an already proven approach to running across many computers in parallel but built using Java to make it easier to integrate with existing services and APIs. As an example of the power of NoSQL and Hadoop the often quoted example of the *New York Times* processing 4 terabytes of Tagged Image File Format, or TIFF, data into 11 million PDFs in 24 hours using multiple Amazon Elastic Compute Cloud, EC2, instances costing \$240 was actually achieved using Hadoop. However, it is important to understand that they will perform poorly in traditional IT structured applications where the focused structure of the data tables aligns directly to the online transaction processing of the application.

CAPGEMINI & GROUP PARTNERS - JOURNEY TO THE GOVERNMENT CLOUD



START HERE

The Context For Government Cloud

"The marketing hype around cloud has left many, both inside and outside government, skeptical, confused and cautious about how to use cloud in the public sector, and what this might mean in practice"

- Clarify With Stakeholders:
- THE BUSINESS DRIVERS
- CHALLENGES

Define The Government Exam Question

"The question for public sector leaders is not if cloud is a tool for improvement, but how to take action to maximize the advantage of cloud to solve government's "priority" challenges"

- CAPTURE A CLEAR STATEMENT OF THE CHALLENGE & GOALS ALL AGENCIES
- ALIGN STAKEHOLDERS FROM ALL AGENCIES

Describe The Cloud Potential

"Cloud has the potential to help government meet the challenges by offering increased agility and efficiency. Only by taking the steps needed to take advantage of it"

- DISCUSS AND AGREE THE POTENTIAL VALUE

Frame The Approach To Cloud

"Recognizing that this involves a mindset change as much as it does any other, we believe that a leadership community (frequently involving people from across government) must be formed and empowered collectively to re-evaluate the context, to share views and concerns, and to reset the context within which their operations/services will work"

- SHAPE THE STRATEGY IN A CO-CREATIVE ENGAGEMENT ACROSS LEADER COMMUNITY

The Journey to Cloud in the Public Sector

NOTE: The proposal is to develop a generic, highly visually engaging, logical journey map, based on the Group Partners approach (which won the Capgemini internal innovation award in 2009 on eBorders, and has been used on a number of occasions to good effect before and since). The outline of the logic is in the diagram below.

This generic basis can then be used as a repeatable frame to make specific roadmaps for clients consistent with their context.

The Journey



Personalize The Program For Business And Technology Stakeholders

"Cloud value comes about through bringing business and technology stakeholders together to assess current and outside-in potential. It is thus imperative to consider the different perspectives of business and technology stakeholders. We have grouped them into a set of six generic role types - each with their own needs, views and challenges"

- A CUSTOMIZED APPROACH TO YOUR SPECIFIC ENVIRONMENT AND CHALLENGES

Develop The Shared Cloud Framework

The following five perspectives help put cloud in context. For each, there are a number of key questions to understand how to help them in their deliberations:

- 1 Business value: How do we make business and technology functions connect to maximize value from cloud?
- 2 Business applications and services: What are the business applications and services that the organization, and how suitable are they for cloud provisioning?
- 3 Business models: How do we make sure our business case and success in the cloud?
- 4 Contracting for cloud: What do we need to buy cloud services? How do we ensure that the technologies fit together?

Engage Those Stakeholders

"Central to our approach is bringing together stakeholders from across government to outline public services, policy and operational technology functions. Each of these groups need to be engaged to realize the maximum advantage of cloud solutions."

- COLLABORATIVELY DEFINE AND FRAME THE STRATEGY



Ten Game-Changing Technology Shifts

1. People rather than IT are the new focus

What people want is contextually relevant information, and the ability to trigger processes to do something with this information where and when they want it. Popular demand has led to the creation of a plethora of new tools which provide individuals with near real-time communication and data. The technology to enable these tools is based on Internet, Web services and cloud services and is very different from the technology of client-server application-centric IT systems.

2. Intuitive presentation and usability

There has been a radical change in the way data is presented to users, driven by the consumerization of IT. New devices – like the iPad or Windows 7 phone – have interfaces designed to make the user's life easy. The design success of these devices has ratcheted up users' expectations. People-centricity and the new devices of the consumer technology revolution mean that the way we write and deploy software has to change, for example by making use of visually-based development techniques.

3. From big IT to small services

The way in which new services can be developed is hugely different from big complex transactional enterprise applications. Large numbers of small services can be rapidly orchestrated into chosen processes, and equally quickly changed again. Solutions can be small, experimental and innovative, while deployments don't have to be big-bang everyone-at-once affairs. These new services will present new challenges and organizations need to make sure they don't underestimate the numbers of services or the complexity of managing this environment.

4. User-driver decisions on user-driven ICT

The enterprise has seen the rise of a new decentralized business technology system alongside the old centralized systems. With the old centralized IT the emphasis is on keeping costs low in both the compliance systems and those that support the core operations of the business. New technologies have provided the freedom to decentralize, to adapt to the market and internal users in new ways. The decentralized technologies are focused on differentiating the business and personalizing services for customers. They are driven by those in contact with customers, rather than those sitting in the back office.

5. Development and deployment methods

Small personalized services that will run on cloud platforms and are therefore simple scripting assemblies require a radically different approach to development than traditional monolithic applications with the need to interface with operating systems to ensure performance and security. The length of time for development and deployment is also a

reflection on the length of time it will stay in service, i.e. a six-month traditional application development may stay in service for many years with ongoing maintenance requiring full documentation, whereas a week-long services development and deployment may have a life of only a few months and then be scrapped rather than maintained.

6. Tight-coupled computers to loose-coupled people

Computers and applications 'push' structured process data. In contrast, people interact and 'pull' contextual information. The former was and still is supported by technology-based integration of the systems through enterprise architecture. For the latter, the user and devices become the focus, with management of 'services' the new integration issue. The difference between the two can be seen in the experience of using the Web, where you choose where to go, versus the experience of using an application, which offers a pre-determined path.

7. Next generation data centers

There is a shift from deterministic numbers of applications and systems to use of infinite resources and services. The move to the next generation data center involves a radical shift in requirements towards participation in a common environment with other data centers through hybrid clouds and a new generation of users/devices. The work of the Open Data Center Alliance focuses on developing common standards for data centers to host services whether from internal or external sources.

8. Context-aware rich Internet applications are changing everything

The proliferation of online data sources in the everyday environment is providing a wide range of new opportunities for innovative online applications. People-centric applications can select location and context-relevant information that is passed to us as part of the rich environment in which we will work and live.

9. An additional functional environment

The old client-server functional environment will continue to exist, but alongside a new cloud-based one. The new functional environment is justified by providing increased value, rather than cost reduction. The users of this new environment will be decentralized and tend to be customer-facing.

10. New technology has enabled smart business innovation

Achieving both low cost and high efficiency with old IT structures meant a trade-off with flexibility. As such, any new business activity had to be aligned to the current activity. Now, new quickly deployed technologies at the edge of the organization can exploit the strengths of the core systems without requiring them to be customized.



About Capgemini and the Collaborative Business Experience™

With more than 115,000 people in 40 countries, Capgemini is one of the world's foremost providers of consulting, technology and outsourcing services. The Group reported 2010 global revenues of EUR 8.7 billion. Together with its clients, Capgemini creates and delivers business and technology solutions that fit their needs and drive the results

they want. A deeply multicultural organization, Capgemini has developed its own way of working, the Collaborative Business Experience™, and draws on Rightshore®, its worldwide delivery model.

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