

Rebalancing the IT Equation with Cloud Computing to drive Business Agility

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Abstract — Globalized world of the twenty-first century has made the world flat. Radical "nonlinear change" which brings about a different order is becoming more frequent. Furthermore the pace of change is significantly more rapid. Business networks have become more complex and interwoven. In different industries we witness large differences between the ability of firms to sense highly uncertain and unexpected events and swiftly respond by changing businesses and business processes. Technology innovation, long-term public policy shifts and deregulation are destabilizing the business landscape and reshaping the world in which we live. In particular, the Internet as a communication and transaction infrastructure has led (and will lead) to turbulence and uncertainty in the business and consumer markets. To succeed in this competitive and fast-changing world, businesses need to be more agile and responsive, and they need to keep costs to a minimum. Cloud computing addresses all of these points: agility, responsiveness, cost.

Index Terms— Cloud Computing, Agility, Business Agility, IT Agility, Cost-Agility Equation.

I. INTRODUCTION

Cloud is a fresh and superior way to organize and manage information technology resources and services—and a new and better way for a business to consume them and put them to work. In Cloud Computing IT resources are pooled in a flexible form that the business people and processes can draw upon precisely as and when needed.

What does that mean for a business? Answer in a word - agility. Agility is creative responses that turn problems into opportunities. By the means of 'Business on the Cloud', organizations gains business agility in the form of - mastering what we call "acquisition-to-action" cycle means rapidly gain access to data, fast analyzing and acting quickly by making decisions on/before time; turn out to be more innovate and be capable of launching new business capabilities faster; be able to scale business operations up or down as and when needed; be able to tap into new information and expertise—both inside the company and in the marketplace—on demand. Cloud fosters agility in these concrete, pragmatic, and powerful ways [1].

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II. DEFINITIONS

A. Agility

Agility is a concept that incorporates the ideas of flexibility, balance, adaptability, and coordination under one umbrella. In a business context, agility typically refers to the ability of an organization to rapidly adapt to market and environmental changes in productive and cost-effective ways. The agile enterprise is an extension of this concept, referring to an organization that utilizes key principles of complex adaptive systems and complexity science to achieve success [2].

In one words, we can say, *Agility is Creative Responses that turn Problems into Opportunities.*

B. Business Agility

According to Wikipedia - "The ability to adapt rapidly and cost efficiently in response to changes in the business environment." — [3]

Gartner defines - "The ability to sense environmental change and to respond efficiently and effectively to it. Sensing the need for change also includes the proactive initiation of change." — [4][5]

"The ability to both create and respond to [anticipated and unanticipated] change in order to profit in a turbulent business environment." — [6]

"The ability of enterprises to cope with unpredictable changes, to survive unprecedented threats from the business environment, and to take advantage of changes as opportunities" — [7]

Bring together above definitions we obtain new equation as - Business Agility = Rapid information access, analysis, decisions + Rapid business innovation + Rapid deployment of business capabilities + Rapid scaling of business operations up and down + Facile collaboration and access to resources + Security, compliance, business continuity.

C. IT Agility

IT agility refers to the ability of the IT function to sense external changes and respond internally and externally to requirements so arising. It is an umbrella concept containing IT function agility (internal response dimension) and IT-business partnership agility (external response dimension) [8].

IT agility is the capability of organizations to anticipate and respond to business change and maintain IT costs to within 15% of revenue change.



D. Agile IT Function

An agile IT function is one that can sense changes in the organizational environment (and beyond), and is capable of adjusting and responding internally to those changes. The stress here is on the internal nature of adjustment. IT function agility is contained in IT agility [8].

E. Cloud Computing

Gartner defines, “cloud computing is a style of computing where massively scalable IT-enabled capabilities are delivered ‘as a service’ to external customers using Internet technologies.” [9]

According to Wikipedia, “Cloud computing is a style of computing in which dynamically scalable and often virtualized resources are provided as service over the Internet. Users need not have knowledge of, expertise in, or control over the technology infrastructure in the “cloud” that supports them”. [10]

The National Institute of Standards and Technology (NIST) defines cloud computing in a specific manner, by this we can understand the cloud computing in a better way, that: “Cloud computing is a model for enabling convenient, on-demand network access to a shared pool of configurable computing resources (e.g., networks, servers, storage, applications, and services) that can be rapidly provisioned and released with minimal management effort or service provider interaction.” [11]

III. IT COST-AGILITY EQUATION

In economics, it is a supply-and-demand equation that drives Information Technology in the organization. Within the IT organization, it is a *cost-agility equation* with most discussions today focused on cost controls rather than the greater potential benefit—business agility. In the present economy, IT organizations are focused just about cutting capital and operational expenses with new IT products rather than building company’s competitiveness or better revenue platform [12].

Cost is Important

IT organizations are extremely focused on cost—not to the exclusion of other important factors, of course, but, given a situation of relatively even capability, cost will be the tiebreaker that directs the decision. This reflects a general rule of thumb in business, which is that cost is a factor, even if not the most important factor; it is, however, never ignored. The fact that in most businesses IT is considered a cost center means that price of its inputs is even more important. Given technology’s relentless pace of innovation, the number of companies that have suffered as their former competitive advantage is eroded by industry developments is legion. The number of IT vendors that have foundered on an attempt to justify a high price in the absence of true competitive advantage is also legion [15].

Agile Companies are focusing on Agility

In an era of furious and constant change, organization are rewriting the rules and inventing new ones on a daily basis. Of course, finance is often at the center of the revolution, most forward thinking organizations are focusing on other side of the coin – the ‘agility’ (or business agility). With the various innovations in technologies such as virtualization, SOA, Web 2.0, etc., they are able to respond more quickly to events than their competitors and they could either contain profitability or improve it and often take market share. Agile

companies do more than cost cutting; they find ways to respond creatively to difficult situations. They use that sense of urgency to motivate them instead of letting it intimidate them. They explore new ideas and in those new ideas they find the seeds of their next round of growth.

IV. SIGNIFICANCE OF AGILITY IN BUSINESS

Agility is not merely reaction, but also action. First and foremost, agile organizations create change—change that cause’s intense pressure on competitors. Creating change requires innovation—the ability to create new knowledge that provides business value. Second, Agile organizations have an ability to react, to respond quickly and effectively to both anticipated and unanticipated changes in the business environment [6]. Agility has a dual role: it is both the end result of change and it is the driving force of change. It’s not static or specific. It has metamorphic qualities—changing as the business environment changes. Agility becomes what it must be in order to deliver results [16].

Focus on Agility Dividend

In a typical business world where products and services are quickly copied by competitors and companies compete mostly on price, it’s a common say -“Use responsiveness and innovation to differentiate your products or participate in what economists call a - grim race to the bottom”. If price is the only meaningful difference between two products then they are commodities and customers will simply chose the lowest price. Business agility is about finding ways to wrap otherwise commodity products in a blanket of value added services that can be constantly tailored to respond to customers’ changing needs. Customers want a good price but that doesn’t mean they want the lowest price if a product provides unique features and services that customers value. Companies that learn to wrap their products in a tailored blanket of value added services consistently earn higher profits – that are the agility dividend - and that’s what business agility is all about. Also, since most value added services are information based, that’s how *IT becomes part of the profit equation* in a company instead of just a cost center [17].

Benefits of being an Agile Company

- 1) Agility shows rapid improvement and innovation – Knowing when to change.
- 2) Agility meets strategic directives quickly and intelligently – Knowing what to change.
- 3) Agility drives company-defined changes and goals – Knowing how to change.

V. IT AND BUSINESS AGILITY

IT can be considered both an enabler and a disabler of agility for organizations. On the one hand, IT provides new possibilities for the organization to do business. On the other hand, IT binds the organization into certain configurations and processes that are facilitated by the technology. In many cases, the latter disabling aspect can predominate because although IT offers these new possibilities, they are long-term solutions and do not necessarily answer the daily challenges and changes that emerge from the environment.



Thus, IT can be viewed as a barrier to the changing capacity of the organization. As the significance of information systems in business increases, the need for agile IT management will grow in significance [8].

In the wake of current economic crisis, a new kind of IT organization has emerged - one that has reduced fixed costs by using on-demand solutions approach. This degree of "IT agility" helps organizations better capitalize on business opportunities and minimize risks today. It is no longer about zeroing in on "cutting IT costs" (although that is certainly part of the equation). It is about taking better advantage of new, available Service Delivery Models to match IT initiatives with business performance. The study [13] distinguished the IT practices of "top performer" organizations - as defined by those that achieve the best results across more than 20 relevant IT agility metrics - from those that experience more typical performance results. The results revealed are -

Only 20% of top performing organizations rank software infrastructure innovation, such as integration middleware, as a "highly effective" way to meet goals.

80% of top performing organizations say that technical infrastructure virtualization with storage, servers and other needs is highly effective.

Only 33% of average performing organizations believe that cloud computing and other on-demand infrastructure sourcing is a highly effective way to meet goals.

67% of top performing organizations believe that cloud computing / on-demand infrastructure sourcing is highly effective.

VI. CLOUD COMPUTING AND BUSINESS AGILITY

A. Computing since 1950's

In the 1950's almost no organization owned a computer. Computers were new fangled gadgets and nobody really knows if there is any advantage to using them: they were scientific devices. How could science apply to a haulage business or an insurance company?

At that time, Computing was consumed as a service rather than owned as a capital asset because they were too expensive for most organizations to own and also nobody was ready to take the risk associated with the acquisition of such an expensive resource.

However, there uses grew. Organizations outsourced their calculations problems from teams of the people who took days, weeks or months to come up with an answer, to computer companies, for whom the greatest delay was the delivery of the program and the delivery of its results.

This extra speed gave these companies' "business agility". It meant they could respond more quickly to events than their competitors and could either contain profitability or improve it and often take market share.

We find ourselves in a similar position today. Large computer companies with masses of compute resources and storage capacity are offering immensely scalable computer services on a pay-as-you-go and only pay-for-what-you-use model [18].

B. Cloud Computing enables IT Agility

There are at least 2 types of agility that cloud computing could potentially enable [19] -

1) The first is being able to provision resources faster than it

would take in a traditional environment. Time to market, how fast you can see that an idea is working or is not working - both are positively affected.

2) The second is being able to right-size your resources (sometimes this concept is called "elasticity"). It eliminates the need to overprovision - start small, scale up when demand goes up, scale down when resources are no longer needed. In this case, agility refers to speed with which you can implement the upsize/downsize operation. No doubt cloud computing opens new opportunities in this space.

To better understand the result of choosing Cloud Solution let us take an *example*. Consider a startup company or a new sales division within an existing large company or simply a new department. When a business starts, it typically has a small number of customers and over time that number grows. There are really two main issues here. One impacts profitability and other agility.

Investing in resource before the customers have been acquired is generally seen as a prudent measure. However, over investing in resources that are either never used or not used for say 6 months will negatively impact profitability. Being able to quickly provision resources to cope with unpredicted customer demand is an agility problem. In say, an online business, if a new customer visits the website, and has a bad experience because it is slow, unresponsive or unreliable, there is a greater loss than that single customer's business. As we all know, satisfied customers share their experience with 1 other person, but dissatisfied customers share their experiences with 10 other people. So, it is vital that the business is able to respond in this way because a product or service which catches the imagination of customers might suddenly result in sky-rocketing number of visitors.

The events which trigger fast growth are entirely unpredictable. Sometimes the product or service is so compelling that fast organic growth occurs naturally. Other times it can be a business that has had slow but steady growth for say 12 months, but then gets a heavy and positive mention by an influential celebrity on peak-time TV. This sort of event can result in a well scaled website reaching maximum capacity and creating large numbers of unhappy customers, each sharing their bad story with 10 others, within 15 minutes of the TV event which initiated the problem. 24 hours later, the TV might have a negative news story about how the celebrity endorsed the product but the site was unable to cope causing mass dissatisfaction with tens or even hundreds of thousands of potential customers. The negative news story can simply exacerbate the problem halting the previous slow but steady growth and turning things in a negative direction.

The cloud increases agility in these situations because there becomes a direct relationship between the cloud resources used and the number of visitors to the site. So the cost of cloud computing resources is proportional to the business the site generates. Being able to scale the cloud resources within minutes of a significant event like this is true agility [18].

Again, let's be clear. A business could buy and maintain a huge data centre at the outset and live with those costs based on the notion that the business will eventually make enough money to pay for it. What the cloud does is permit agility in a profitable way: where the cost and the benefit are directly related to each other.

C. Live Business Cases

Considering uncertainties in present economy, companies still hold a 'do more with less' mindset. This has put more emphasis on agility as organizations attempt to stay competitive with fewer resources. And technological advances have enabled new levels of agility that bring many benefits including cost, performance and revenue growth. *Business Case 1:* Aidmatrix is in the humanitarian aid business – connecting those who have with those who need. More than 40,000 business, nonprofit and government partners use Aidmatrix's supply chain management capabilities to mobilize more than \$1.5 billion in humanitarian relief each year. During and immediately following a crisis, demand can reach up to 1,000 times the normal rate. When disaster would strike, Aidmatrix had to set up and tear down physical infrastructures at local data centers in the area of need. This slowed responsiveness and was costly. To resolve all these issues, they adopted Windows Azure, and now they are capable enough that they can set up operations in a country at a fraction of the time with much lower costs [14].

Business Case 2: 'Healthcare products' is a fiercely competitive industry with companies jockeying to develop and deliver the right products, at the right prices, while providing superior service. Leading organizations are also looking to keep costs in line and manage tight margins while navigating this highly-regulated industry, which is subject to extensive and frequently changing laws pertaining to products, distribution, manufacturing, and marketing. A Fortune 500 healthcare organization faced all these challenges, while also looking to expand into new high-growth markets through mergers and acquisitions. Among its major business goals:

- 1) Drive more revenue volume and profitability across the healthcare value chain by enhancing products and services
- 2) Reduce time to market for new initiatives such as customer-facing online order management solutions and EDI systems
- 3) Offer a consistent customer experience across product brands
- 4) More effectively manage tight margins and minimize expenses in non-core businesses
- 5) Comply with extensive and frequently changing laws and regulations

To enable speedier delivery of the upgraded products and services that drive revenue, IT had to reduce the time to market on new technology capabilities. Cloud computing (VMware) delivered on this objective in two ways. First, scalable capacity enabled IT to respond quickly to peaks in demand ("Black Friday every day") by automatically allocating additional capacity to critical customer-facing online order management solutions and EDI systems when needed. Secondly, time-to provision was dramatically reduced from six-to-eight weeks down to just five days

(ultimately a target period of 10 minutes is expected). For example, test and development environments could be stood-up and taken-down quickly, allowing the organization to safely test new functionality in an isolated area, before rapidly deploying. In this same time period, a wave of new acquisitions increased IT demands from additional users and inconsistent customer interfaces across a myriad of new brands. To efficiently integrate the new acquisitions, cloud provided the scalable capacity and automated provisioning that would quickly service fresh demand as well as support existing IT users. To help deliver a uniform "look and feel" that would enable the company to better engage with customers, cloud computing provided standard reusable application components which not only drove consistency but also speed development. Instead of interacting with several different online environments on a daily basis, end-users benefit from a streamlined, standardized experience that minimizes training requirements while boosting individual productivity [20].

D. Cloud drives IT Agility – What survey says?

For companies with agile IT functions, business and IT leaders agree that infrastructure and technology are the primary drivers of that agility. The survey [12] shows that agile companies that have already adopted enterprise-wide cloud deployments are paving the way for their IT organizations to become more responsive and flexible to the demands of the business. In contrast, in companies with non-agile IT organizations, a fundamental disconnect exists between what IT and business stakeholders see as the problem: IT cites money and skill sets, while business cites a lack of infrastructure and technology to meet its needs. The survey findings are -

- Nearly two-thirds (65 percent) of respondents believe that cloud computing plays a key role in increasing IT agility.
- Almost three-quarters (72 percent) of respondents who have already deployed cloud enterprise-wide believe cloud plays a key role in IT agility.
- The majority of survey respondents (65 percent) agree that cloud computing could help their organizations maintain a flexible architecture to support changes

E. Benefits of the Cloud Approach

The various benefits of Cloud Computing can be grouped in three categories – cost, business performance and IT performance [1]. They are –

- 1) Cost & Cost Structure
 - Servers
 - Storage
 - Network
 - Facilities
 - Energy
 - Staff
 - Operations
 - Software Licensing and Maintenance
 - Technology Deployment
 - Capital Outlay

- 2) Business Performance and Agility
 - Accessibility
 - Scaling
 - Innovation
 - Solution Deployment
 - Collaboration
 - Security and Business Continuity
- 3) IT Performance and Agility
 - Service Delivery
 - Cost
 - Speed
 - Efficiency
 - Innovation
 - Business Relationship

F. Implications of Cloud Enabled Business Agility

Cloud computing has great cost cutting potential in certain situations and at the same time it's important to keep the larger business strategy in mind. The agility benefits far outweigh the purely cost saving benefits. If a company's strategy calls for it to improve its ability to bring new products to market and improve its capability to expand geographically and open new offices, then cloud computing is a powerful technology for attaining these objectives.

Using cloud technology to enable new business formation and new product development creates what could be called multinational small and medium businesses (SMBs). With cloud-based technology SMBs can now be truly global where 10 years ago they could not afford the ICT infrastructure to support global operations in an integrated fashion.

G. Advantage of doing Business on Cloud

Companies are now at the point where they need to move on from an internal focus directed at maximizing use of IT resources to an external focus on supporting collaboration and new product development through use of cloud computing. Companies are moving toward externally focused web-oriented architecture projects where they begin using SaaS applications and social media and combining them with selected internal

This is happening because cloud and SaaS and social media vendors are becoming more and more like utilities offering reliable computing power and basic applications like e-mail, video conferencing, ERP, CRM, and a growing array of industry specific applications. Over the coming months and years these vendors will develop economies of scale and expertise that enables them to offer their services at a much lower costs than what most companies would spend to deliver those services internally.

Cloud computing offers significant advantages in its low startup costs and quick delivery of computing resources and its pay-as-you-go cost structure. In addition it offers ease of management and scalability of systems as needs grow. Cloud-based systems are also device and location independent so people can access these systems from anywhere using many different devices from PCs to tablet computers and smart phones like Blackberry, Android or iPhone. And finally, cloud computing enables rapid systems innovation in companies to respond to evolving markets and customer desires.

The primary area that benefits from the move to the cloud is an organization's staff. Most IT departments are overworked and struggle to keep up with the day-to-day tasks that come with maintaining server infrastructure. According to the news source, Infrastructure-based cloud services make it easier for organizations to get by with a leaner IT staff. Ideally, companies can use the extra resources created by the reduced maintenance needs to hire more software development professionals and similar IT workers with skill sets that help the company create revenue, taking the initial costs savings and actually turning it to a financial gain [21].

This shift in staffing also leads to a greater focus on internal software development and programming within an organization. IT traditionally spends much of its time maintaining servers and dealing with day-to-day management problems that arise. Because of this, most IT departments have a long list of projects that they would like to get done, such as writing a custom application or revising an existing program, that get cast aside so IT can focus on keeping everything running. When the IT management impetus is put on the cloud vendor, IT has time to take care of all of those projects.

Also, the cloud infrastructure gives businesses the ability to more quickly deploy new applications and servers, taking a process that would often take weeks or months for even a small change and turning it into something that only takes a matter of minutes, hours and, at most, a few days.

The cloud's ability to accelerate enterprise operations is critical. Traditional IT systems would see companies spend months planning a new server deployment, and then it would take weeks to actually install the systems and test it. From there, it could be another few weeks before the change could be applied at a large scale. This ponderous pace for innovation has slowed businesses considerably over the years, but the cloud promises immediate responsiveness and easy changes, benefits that few businesses can afford to ignore [21].

VII. LINK BETWEEN THE CLOUD, IT AGILITY, BUSINESS AGILITY AND CORPORATE PERFORMANCE

With the financial benefits of cloud computing well established, IT leaders are now beginning to realize its business value beyond cost reduction. This has prompted executives to shift their focus to the strategic benefit of cloud computing: business agility.



Fig 1: Link of Clouds Computing to Business Agility

In a newly released business-agility survey [12], corporate decision makers linked cloud computing directly to business agility, depicted in Fig -1. This data is helpful in rebalancing the IT cost-agility equation, looking at cloud approaches and reframing assessments of IT's value to the enterprise. It shows that the hype around cloud computing is maturing into facts about what cloud can really deliver to both IT and the business.



Game-changing CIOs think business transformation first, then how technology enables it. They are the ones strategizing with their CEOs and other business leaders to look beyond simple cost calculations to the business agility that cloud computing can enable.

Forward-thinking CIOs are deploying cloud computing as a strategic weapon—not just for IT, but to enable full business transformation, eventually changing how they operate their business.

VIII. REBALANCING THE IT COST-AGILITY EQUATION

Finally we reached at a point where we can reevaluate the IT cost-agility equation and make an effort to balance it taking into account the presence of Cloud Computing that gives limitless agility to business. Not every IT project in the world requires agility, and furthermore - not every IT project in the world requires agility at a price. If workload of business does not benefit from increased agility, main driver towards cloud computing in theory should be cutting costs. It can take a form of explicit reduction in expenditures, or it can be paying the same for more, or it can be avoiding some cost which would otherwise have to pay [21]. Also, the attempt to downplay the importance of cost regarding cloud computing is misguided. However, there is a greater mistake in branding cost and agility as conflicting choices, with the implication that choosing one means forfeiting the other. The fact is that low cost and agility both depend upon the underlying foundation of cloud computing: automation. It is automation that supports both lower costs and agility, and both of them equally reflect its nature. Companies that emphasize continuous exploration of potential opportunities followed up by rapid expansion into new markets when an opportunity proves to be successful are the ones that will thrive. This calls for skillful use of cloud computing and related technologies such as software-as-a-service (SaaS), social media and consumer technology devices such as smart phones and tablet computers. Saving money shouldn't be company's primary reason for investing in cloud. Instead, what makes this technology so important today for businesses and enterprise IT is that it essentially gives limitless computing capabilities that can be scaled on demand so quickly that it can make competitor's heads spin. The true reason to adopt this kind of business agility through cloud is to be able to add capacity instantly to devour business markets and drive productivity, sales, revenue and future growth, and all this in such a powerful way. Business should invest wisely to become more agile due to the flexible, powerful and empowering nature of cloud capabilities, thus making a good balancing between cost and agility.

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