CHAPTER 2

The New Economics of Business

Volatility is here to stay. Scaling operations up and down smoothly as conditions change and the ability to pivot quickly and address new threats or opportunities are what make companies successful in today's economy. Business models with high fixed costs are much riskier than they used to be. What happens if actual demand for a company's products is less than predictions? Can the company still be profitable and cover operating costs if only 60 percent of its capacity is utilized? What if only 40 percent of its capacity is activated? Companies with high fixed cost investments in unused production capacity are risking their profits and their very existence.

In the twentieth century, businesses around the world learned the lessons of industrial efficiency and economies of scale. Given reasonably reliable predictions of customer demand and stable prices for labor and raw materials, companies were able to make large capital investments in plant and equipment to achieve economies of scale and meet demand for their products at the lowest per-unit costs, and thus earn the greatest profits. They paid for these investments and their resulting high fixed costs through increases in productivity that enabled them to produce greater and greater amounts of standard goods and services at lower and lower costs.

This was the basic business operating model for most of the twentieth century. But now market volatility is increasing. Products have life cycles measured in months or a couple of years at most. Technology and consumer preferences are rapidly evolving. New fashions and new products and whole product categories pop up without warning, drastically altering traditional customer buying

patterns. Not only is product demand hard to estimate, but so too are the costs of everything from raw materials to labor and transportation. The real-time global economy of the twenty-first century is a very different world from that of the last century.

In volatile times, responsiveness trumps efficiency. It is a better business strategy to trade fixed costs for variable costs. Even though operating costs will rise as business activity rises, costs will also drop as activity drops and costs won't rise at all if expected activity levels don't materialize or a new product doesn't take off. The responsive business model is better for companies wanting greater ability to manage their cash flows and protect their operating profits. This variable cost model is less risky. Although companies can't maximize profits as efficiently as with a high fixed cost operating model, a responsive model gives companies the flexibility to adapt to change and opportunities as quickly as they happen.

Moving to a Variable Cost Operating Model

If we define variable costs as those costs that can be readily scaled up or scaled down in 90 days or less, what percentage of total company operating costs can be considered variable? A lot of companies are faced with high fixed operating costs because of capital investments in plant, equipment, and other assets that cannot be easily reconfigured or quickly sold off. When economic conditions don't match expectations, companies find themselves in the difficult position of having to apply drastic measures to reduce their costs.

Drastic measures take a toll on companies. Repeated downsizing of staff leaves remaining staff demoralized and worried about their own future. Spinning off and selling company business units can reduce operating costs, but the hurried nature of these sales often results in less-than-favorable prices. And some assets simply can't be sold because they are so specialized to unique company operation–or because, over time, they have become obsolete and their value is negligible even though their related operating costs continue to rise.

Companies Need to Operate in Unpredictable and High-Change Markets

If they absolutely have to, most companies could reduce operating costs by 25 to 30 percent over a year through drastic measures and much grief. But this approach isn't something that can be repeated

often or it will destroy the very fabric of the company. This means these companies can operate over the long term only in markets where product demand and prices don't vary more than 5 to 15 percent from one year to the next; essentially, that's the extent they can vary their operating expenses without destroying themselves. These kinds of markets were common 50 years ago. How many markets like that still exist? Which way is the trend going?

What if companies could easily achieve operating expense reductions or ramp up expenses to support production increases without tearing themselves apart in the process? What if a company had an operating model where half or more of its operating costs were variable costs? This kind of company could survive and even thrive in much more volatile markets. And this kind of company would be much better suited for business conditions in this century.

Companies optimized for the more predictable industrial world of the twentieth century are like race cars that achieve great speeds and win races—as long as the course is straight and flat. But when the course makes sharp turns and winds through landscapes of hills and valleys, speed alone no longer wins races. In this century, winning cars and winning companies need to be maneuverable and responsive; they need to shift from a focus on speed to a focus on agility. This is illustrated in Figure 2.1.

The Merging of Business Operations and Information Technology

There was a time not so long ago when all the technology needed to operate most businesses was a phone, a fax, a pen, and paper. Computer systems were mostly used to support back office administrative operations and weren't part of front office customer-facing activities or daily operations. Now, the phone itself is a computer, faxing is one of many services handled by computers, and pen and paper have been displaced by digital communications. Businesses from new start-ups to global corporations now depend on computer systems that thread through everything they do, every hour of every day, front office and back office. Most daily business activities are supported by real-time systems, and operations would come to a halt if their supporting systems stopped.

Companies can't launch new products or services or redesign internal operations without new application systems to support them. In fact, the cost and time involved in developing new systems

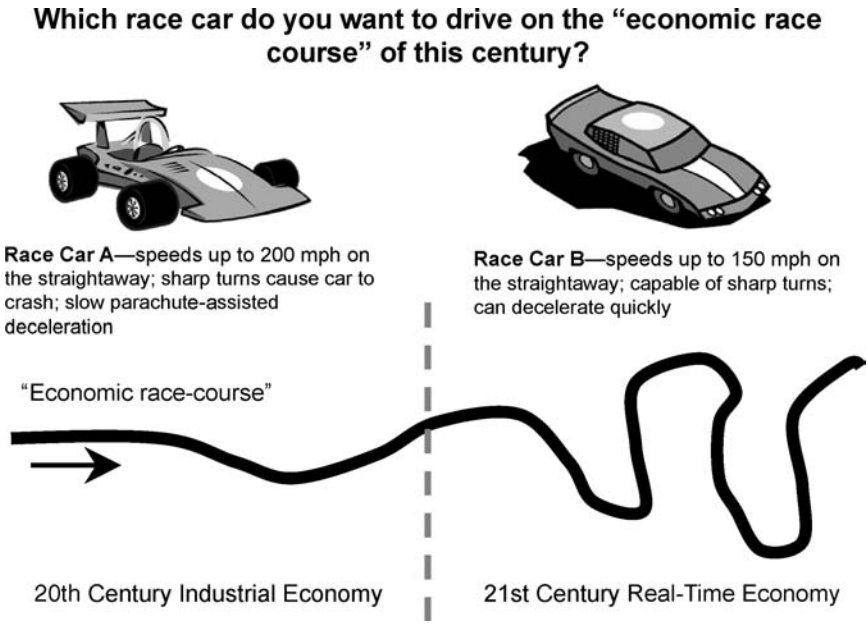


Figure 2.1 Economic Racecourse of This Century

was often the reason companies didn't want to roll out new products or redesign the way they ran their operations. It was just too expensive and too much trouble to do new things, so they perpetuated old products and continued with old ways.

Recent studies show that information technology (IT), the business application systems it supports, and the data centers and staff needed to run the technology and systems, average about six percent of business operating expenses.[1] Yet, ironically, IT and systems are a critical factor in any company's ability to be agile and responsive. This six percent of the operations budget has critical leverage over the profitability of the business as a whole if it can be used to deliver better business responsiveness and agility. More ironic is that, at present, about 70 to 80 percent of company IT budgets goes to the operation and maintenance of existing systems and data centers.[2] So in many organizations, there isn't much money available to design and develop new systems.

Is there a way for companies to shift the expense and complexity of IT operations that are not part of a company's core competencies to outside vendors? Can vendors who specialize in those operations

deliver higher levels of service at lower cost because of their expertise and economies of scale? Could companies then shift the bulk of their IT spending to developing new systems to support continuous evolution and modernizing of existing products? To introduce brand new products? Would this give companies the agility they need and a better return on the 94 percent of their operating budgets they dedicate to non-IT operations and product delivery? Would this enable companies to transform themselves into the maneuverable and agile race cars best suited for the twenty-first century economy?

Information Technology Finally Becomes a Utility

A historical analogy sheds some light on what is happening today. Consider the development of the modern city and the buildings and utility services that made the modern city possible. A little more than 100 years ago in Chicago, the world saw the birth of the modern-day skyscraper. Many architects were drawn to Chicago in the years following the Great Chicago Fire of 1871 because it destroyed the growing city's central core and created an open landscape. The city had a pressing need for new development that created great opportunities for talented architects and builders who could meet the challenge. Architect William Le Baron Jenney designed the first load-bearing steel-frame building that became the 10 story Chicago headquarters of the Home Insurance Building completed in 1885. In the years that followed, the steel-frame skyscraper became the symbol of the modern city.

People who worked in those buildings, and the buildings themselves, depended on a steady and reliable supply of electricity to support their operations. For the first several decades after the skyscrapers were built, they relied on electric power generators installed in their basements. Fueled by coal, these massive mechanical devices required constant care. Mechanical engineers and electricians were required on staff to make sure that the business conducted in these prestigious buildings was not interrupted by the lack of power. These buildings were created to be self-sufficient.

At the same time that the steel-frame skyscrapers were being built, another innovation was changing how companies operated. Chicago businessman Samuel Insull, who had earlier been one of the founders of the General Electric Company, presided over the

creation and growth of the Commonwealth Edison Company. Insull's electrical power company grew steadily and he leveraged its increasing economies of scale to deliver reliable electric power at lower and lower rates to acquire more and more customers.

The Move to Public Power Grids

During the 1910s, companies that owned and operated skyscrapers began considering outside vendors to supply their electricity and debated whether or not it made sense to tap into the new, emerging power grids. From one perspective, building owners saw advantages in getting rid of those expensive electricity generators in the basement. No more coal deliveries, no more staff to shovel the coal day-in and day-out. No more mechanical and electrical engineers on staff. But from another viewpoint, there were just as many people concerned about whether a new power grid would be reliable. Why should we take the chance on a new power grid, they argued, when the building was already self-sufficient?

The finance and accounting people pointed out that electric utilities were able to deliver electricity at lower and lower costs per kilowatt hour compared to the in-house electric power generators.[3] The in-house electric power people countered that relying on outside utilities was a performance and security risk. How could one know if the outside electric utilities would always deliver reliable power? And how could one know if they would stay in business? And then there was the big security question: Since outside electric power would come to the building through exposed electric cables, what if someone cut the power lines to the building? How could they guarantee the security of outside power supplies?

These were all valid concerns, but not enduring reasons to maintain power generation within individual buildings. Electric utilities steadily became more reliable and it became clear they wouldn't go out of business. Power security issues were addressed, and maintaining power reliability and minimizing interruption became an appropriately important area of the power industry's focus.

By the 1920s, the debate about whether to rely on in-house power generation or to outsource that function to an electric power utility was over, and we all know who won that argument. In the end, it wasn't really so much about ''who'' as ''what.'' The bottom line won the debate. The idea of providing ongoing, nonemergency, day-to-day

power for a skyscraper from an independent provider isn't even a discussion, let alone a debate, today. When it comes to a contest between security and productivity, the winner is always productivity (except in a small number of isolated and clearly defined situations).

As the twentieth century progressed, companies no longer carried the fixed costs associated with generating their own electricity. Whether they were early power grid adopters or were laggards, companies and building owners eventually tapped into the public power grid delivered by electric utilities. And they redirected the money they once spent on generating power to activities that created a much better return on their investment.

Fast-Forward 100 Years

Now, as we debate the pros and cons of outsourcing computing functions to computing utilities, the arguments and concerns are in many cases similar to the electric power debate a century ago. Just substitute computing power for electrical power and the analogy is complete. Why should a given company maintain a large data center, along with the staff and resources to operate it? On the other hand, why would a company trust its data center operations to a service provider? The concept continues to be argued in many circles. IT vendors stand at the ready and heavily promote their utility computing or cloud computing capabilities (and some organizations consume them on a substantial scale). At the same time, there's an entire landscape of corporate IT organizations concerned about this model who debate the challenges related to service-level agreements, outages, data security, and more.

It comes down to a basic question that each company must answer: ''What business are we really in?'' If companies don't have to worry about all of the financial and operational overhead associated with building and operating their own data centers, would they then be able to focus more on what they do as a business? As recession-era budgets continue to stagnate, and CFOs constantly question capital expenditures, companies are increasingly challenged to investigate and then make use of more efficient ways to deploy basic computing power. How companies and their in-house IT groups structure themselves—and what activities they chose to focus on—will be critical as more outside service

providers are able to deliver 1) reliable computing power at 2) cost-effective price points based on 3) their increasing economies of scale.

Variable Cost IT Operations Enable Business Agility

The biggest technology opportunity for companies today is to reduce their total expenses through targeted IT investments that are converted from sunk capital models to variable cost operating models. In this high-change and unpredictable economy, many business leaders have drawn the conclusion that they must steadily move to a variable cost operating model if they are going to thrive.

Dr. Howard Rubin, a researcher in techno-business strategy and global software economics, is Professor Emeritus of Computer Science at Hunter College of the City University of New York.[4] He's done extensive research on the potential impact of companies moving to cloud computing models. His data clearly shows companies have to adopt a variable cost operating model through skillful use of IT in order to enable business agility and thrive in the next few years.

Dr. Rubin observes that IT is still a young, emerging field with only about 50 years of history to date. He suggests that the real impact of IT is only now starting to reveal itself. According to Dr. Rubin, ''I'm like Darwin in the Galapagos Islands. I collect data, look at patterns that emerge and try to figure out what they mean.'' Then he described some patterns from his research and described what they might mean.

The Patterns Reveal an Interesting Story

Dr. Rubin's research shows that, as a whole, company revenues and company operating expenses for the U.S. economy converged in 2008, wiping out profit margins. As a result, companies started to look for ways to reduce operating expenses. Since IT is a large part of the operating expense in most companies, business leaders have naturally focused on reducing IT expenses. Dr. Rubin observes that, ''Technology spending has collided with current economic conditions as IT organizations have failed to enact agile IT economics and make their value proposition transparent. The pressure is on to cut IT.''

But he goes on to say that there's a big difference between cutting costs and optimizing costs, and that a lot of companies are confusing the two concepts. Companies often lump all IT expenditures into a business overhead category when, in reality, much of their IT expenditures are for growing revenue and reducing operating expenses. As a result, a good portion of IT expense is not really overhead.

Dr. Rubin's research reveals that IT financial models in most companies have only a 30 to 35 percent variable cost. The rest of the IT budget is fixed cost composed of capital expense related to the cost of purchasing IT infrastructure, and the fixed cost of people to run that infrastructure. Traditional cost-cutting strategies involve cutting staff, renegotiating vendor contracts, and delaying new projects, but the cumulative effect of these actions isn't really that much. Instead, Dr. Rubin's research suggests, companies would be far better off if they lowered the fixed cost of their IT infrastructure.

The data goes on to show that there's big opportunity to reduce IT costs by reducing unused IT infrastructure capacity through use of Dr. Rubin's concept of the ''IT Commons'' that could provide companies with a 60 percent or more variability in their IT operating expenses, resulting in money that could then be spent on proactively developing new, contemporary systems instead of backward investment in maintaining legacy systems.

Optimize, Resize, and Give It Up

The IT Commons is being created right now by companies like Amazon, Google, Hewlett-Packard, IBM, Microsoft, and other IT vendors who are building out enormous data centers and offering their computing power and software applications on a pay-as-you-go basis. These organizations offering pricing based on economies of scale that will ultimately drive down the total cost of IT services.

Dr. Rubin explains that the opportunity of the IT Commons concept is for companies to leverage the computing marketplace and to take advantage of rapid commoditization of IT services for nonstrategic business functions like running data centers and standard applications like email, human resource information systems (HRIS), enterprise resource planning (ERP), customer

relationship management (CRM), and so on. ''Give it up,'' he said, ''if a provider can do it better and more efficiently, then go with them.'' In addition, he advises companies to engage in transformational IT sourcing activities like server virtualization, virtual desktops, cloud computing, and software-as-a-service (SaaS).

Companies engaged in these transformational IT activities that leverage the resulting economies of scale to reduce IT operating expenses will see total IT spending go down as a percentage of revenue go down, even though IT spending as a percentage of total company operating expenses goes up. This is the difference between optimizing IT spending and simply cutting IT costs. Ultimately, companies that understand how to optimize their IT spending will achieve more agile business models. Companies that don't understand this concept will experience the difficulties inherent in clinging to outmoded, traditional behaviors during times of rapid change.

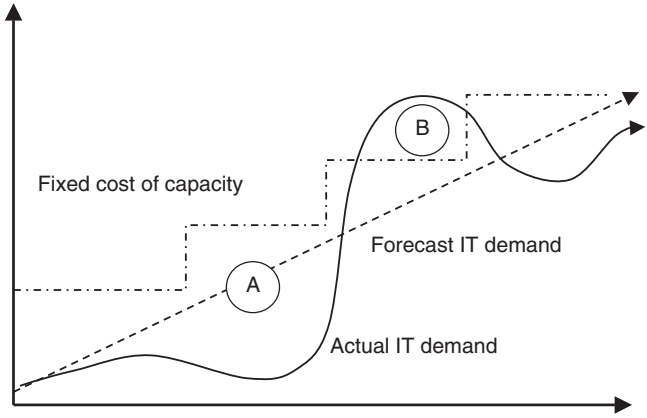
Desirable Characteristics of the New IT Architecture

In the current economy, companies are looking for ways to cut IT expenses, yet the real opportunity is to find ways to manage total *company* expenses so that they track with the demands of business operations. Saving 10 or 20 percent on a company's IT budget is relatively small compared to deploying IT wisely to save 10 percent on the company's overall operating expenses—or by using IT to grow company revenue by 10 percent.

With newer technologies, companies have the opportunity to shift from the traditional fixed cost IT operating model shown in Figure 2.2 and move toward a variable cost model like that shown in Figure 2.3. Companies can power their business operations with IT infrastructure that meets three operating standards:

1. Low capital expense
2. Variable cost of operations
3. Scalable computing platform

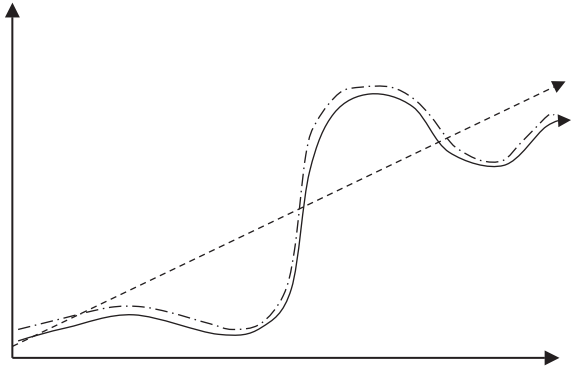
Lower capital expenses are the order of the day because revenue and profits are under intense pressure, credit markets are tight, and loans are harder to get. So there is naturally less money for capital investments. As well, since we're experiencing a period of rapid technological change, big capital investments in technology are risky



In the traditional IT operating model, the cost of IT capacity is fixed and only roughly corresponds to actual demand. Often there is oversupply of capacity, as shown by A and sometimes there is undersupply of capacity, as shown by B.

Figure 2.2 Traditional Fixed Cost IT Model

and might result in owning technology that becomes obsolete much faster than expected. So smart executives are finding ways to get systems in place without a lot of up-front capital expense. They're learning to shift their investments from building wholly owned data centers to delivering new business operating capabilities.



In the variable cost IT operating model companies can closely match IT capacity with actual demand and thus link IT expenses with company activity and revenue.

Figure 2.3 New Variable Cost IT Model

Committing to a variable cost operating model standard is smart because it protects company cash flow. Pay-as-you-go operating models mean operating expenses will rise if business volumes rise, but will also drop or stay small if business volumes contract or grow more slowly than expected. In other words, you pay more only if you're making more, and you pay less if you're making less. In our increasingly unpredictable economy where companies need to experiment to find new opportunities, variable cost business models are best for managing financial risk.

Committing to scalable systems infrastructure enables companies to enjoy the benefits of these standards. A scalable systems infrastructure enables a company to ''think big, start small, and deliver quickly.'' Company executives can create strategies with big potential and try them out quickly on a small scale to see if they justify further investment. Companies can quickly start by targeting 80 percent solutions that address the most important technology requirements first, and then build additional features and add more capacity as business needs dictate and revenue climbs.

A Combination of Technologies Creates Cloud Computing

Since the turn of this century, several different, but related, types of information technology have been rapidly evolving and are now collapsing together to deliver computing resources on demand almost anywhere in the world. When technologies involving the Internet, web browsers, virtualized servers, parallel computing, and open source software are combined, they produce an entirely fresh set of possibilities for delivering computing resources.

The term *cloud computing* is the concise description of these combined technologies. IT vendors are offering the resulting package to companies that want to outsource some or all of their traditional IT operations like running data centers and operating traditional application packages like ERP, HRIS, CRM, and other business support applications.

Some Working Definitions of Cloud Computing

The exact definition of cloud computing is still evolving. Different IT vendors put their own spin on the definitions they offer, but

there is increasingly more agreement than difference in their definitions. Here are several working definitions:

- ''A style of computing where scalable and elastic IT capabilities are provided as a service to multiple customers using Internet technologies.''[5]
- ''Consumer and business products, services and solutions delivered and consumed in real time over the Internet.''[6]
- '' . . . a broad array of web-based services aimed at allowing users to obtain a wide range of functional capabilities on a 'pay-as-you-go' basis that previously required tremendous hardware/software investments and professional skills to acquire.''[7]
- '' . . . a way of utilizing resources wherever they may be when you need to use them. In that sense you just need to insure that your networking, security, and hardware infrastructure are robust enough to deliver the resources when needed, but just as important, your applications need to be able to execute well in that environment. To me it is having what you want, when you want, through your virtual desktop no matter where you are.''[8]

From these three definitions more (just do a web search on ''cloud computing definition'') we can easily see there are three particular characteristics widely agreed upon that describe cloud computing:

1. *Practically unlimited computing resources.* Resources like computing power, data storage space, and additional user sign-on IDs for applications are available on demand as needed and this enables a high degree of agility and scalability in meeting evolving business needs.
2. *No long-term commitments.* Computing resources are immediately available and they may be used as long as needed and then retired because they are acquired on a month-to-month or even a minute-to-minute basis.
3. *Pay-as-you-go cost structure.* Because there are no long-term commitments, the cost of cloud computing resources is a variable cost, not a fixed cost; cost fluctuates depending on the amount of usage.

Cloud Computing Has Three Component Layers

Cloud computing technologies continue to change rapidly. Certain components are changing so fast that the names, and technical details of how they operate, change significantly every 6 to 12 months. Nonetheless, we can still group cloud computing technologies in three basic categories or layers. These layers support each other, and the relationships between the layers (and the way each of the layers operates) remain relatively stable. We'll use these three layers to create a basic model of cloud computing and provide a framework to discuss cloud computing technology (see Figure 2.4). These three layers are:

1. Hardware virtualization
2. Data storage and database management
3. Applications and application development environments

Not that many years ago, companies deployed applications on a dedicated server or sets of servers. This resulted in some servers

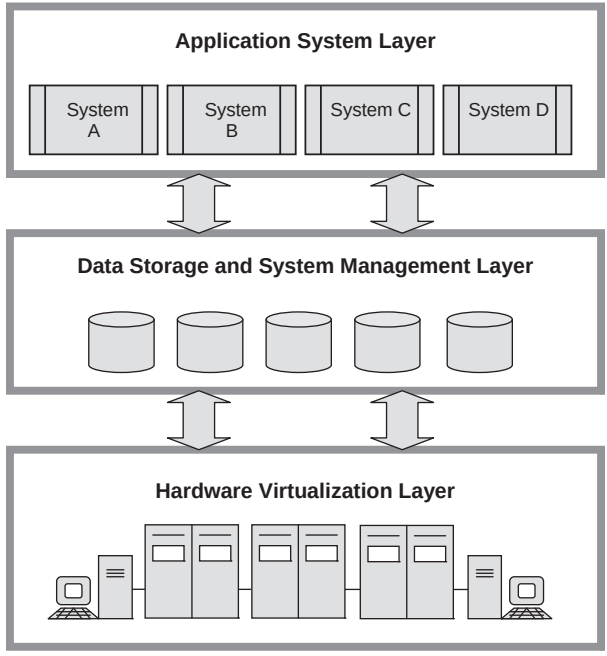


Figure 2.4 Three Technology Layers of Cloud Computing

remaining idle or running at less than full capacity at any given point in the day or the business cycle. Today, *hardware virtualization* refers to the abstraction of physical computer resources so that many different computers or application servers appear to be available to run different application systems even though there may be a much smaller number of physical servers in the environment. The term *virtual machine* (VM) refers to a software implementation of a computer or application server that executes programs like a real physical machine, but that server is tapping the resources across a pool of virtualized servers in order to maximize efficiency. As a result, hardware virtualization enables companies to optimize the use of physical computer resources and improve system administration. Virtualization is a common practice on mainframes and is becoming widely available for other computer architectures like application servers built from low-cost computer chips and commodity hardware. In the cloud computing world, this layer is also referred to as *infrastructure-as-a-service (IaaS).*

Data storage and database management in virtualized hardware environments is far more efficient and flexible than ever. Instead of buying a new physical server to host each different database, those different databases can be supported by different virtual machines. The processing power of these virtual machines and the storage capacity of these databases can then be dynamically changed based on actual business requirements on demand and as they occur. In addition, these different virtual servers can be set up to run different operating systems like Linux or Windows as needed. In the cloud computing world, this layer is also referred to as *platform-as-a-service (PaaS).*

Applications and application development environments can leverage hardware virtualization and data storage and database management capabilities in a cloud computing environment. Application systems to support different business operations can be hosted on virtual machines that are scaled up or scaled down hour by hour and as needed to meet changing business user demands. In this environment, new copies of a given application system can be created instantly and put into operation as needed. In cloud computing, this layer is referred to as *software-as-a-service (SaaS).*

Depending on what system developers wish to use, application systems can be developed on cloud computing platforms that support different programming languages, testing platforms, and

system management tools. Some popular development environments are provided by Google and Amazon and Microsoft. Popular programming languages that are supported include languages like Java, PHP, Ruby on Rails, and C#. (In Chapter 3, we'll explore more of the different kinds of technology that are used in each of these three cloud computing layers.)

Implications of the Transition to Cloud Computing

Momentum created by the pressures of our present economy is driving us to more widespread implementation of cloud computing. Larger companies are creating their own internal ''private'' clouds, and smaller companies are moving to clouds from external service providers commonly called ''public clouds.'' The twin concerns of performance and security are valid as companies transition to these models, but they are increasingly met with practical conversation and decision making, rather than just excuses or reasons to avoid a switch to cloud computing. Vendors are rapidly delivering tools to respond to and manage these concerns.

The move to cloud computing is the most profound evolution, if not revolution, since the emergence of the Internet. It is challenging (if not causing) significant change to the ongoing mission of in-house, corporate IT groups—and especially to the way they are run. In its traditional model, the bulk of staff in these departments has been devoted to IT functions including operating and maintaining data centers, data networks and PCs, as well as the monitoring and enhancing of application systems that are hosted in those data centers or running on desktop PCs. Continued adoption of cloud computing will shift most of these traditional activities out of corporate IT groups and into the cloud service provider organizations.

In fact, the information technology profession as we have known it for the last several decades is dying; its obituary is already written. Companies are transferring the risk of high-ticket technology investments—like wholly owned data centers and internal application hosting—to highly focused and specialized service providers. Who's looking after the network? A service provider. Who's monitoring application performance? A service provider.

Because of cloud computing, in-house IT professionals in most organizations are facing big changes in their careers, what they do, and their earning power. The spread of cloud computing is, quite

simply, disrupting the enterprise. Just as some IT professionals in the 1980s resisted introduction of PCs in their companies, and some IT professionals questioned the value of the Internet in the early 1990s, some IT professionals are now resisting the introduction of cloud computing in their companies. As in previous, disruptive eras, new technologies reduce demand for certain traditional skills and they change the way the IT profession is organized. Cloud computing is no different.

Cloud Performance and Security Concerns

Just as performance and security were central to the debate 100 years ago about whether to rely on outside vendors to provide electric power, they remain central to today's debate about cloud computing. Not surprisingly, there are many technology vendors creating products to address these performance and security concerns.

New start-ups and established IT vendor companies are developing performance monitoring tools for cloud computing environments. Cloud computing service providers are buying these products to support the growth of their cloud computing businesses, and to assure their customers that they can monitor performance and consistently deliver high levels of service. For many application systems, there are adequate performance management tools already available. In other cases, there are still significant technical issues to be addressed. But if the history of technical development in the past several decades is a guide, we'll see continued and rapid technology progress address these issues.

IT vendor companies are increasingly rolling out suites of new products to address security for cloud computing environments including tools that deal with cloud intrusion prevention and global threat correlation. By using these products, companies can create computing and collaboration environments that integrate their in-house IT infrastructure with cloud-based application systems, and they can exercise a high degree of control over who enters those environments and what information those people can access.

As these products rapidly improve, they're analogous to good brakes on a race car; the better the brakes, the faster you can drive the car on the winding roads of the twenty-first century. Good performance monitoring and security protection enable companies to go faster and faster in deploying new cloud computing applications

because they eliminate the worry about performance and security that would otherwise slow them down. (We'll go into more detail about performance monitoring and cloud security in Chapter 4.)

Cloud Computing Drives the Creation of New Businesses

Under the relentless pressure of economic necessity and unpredictable market conditions, companies have to find ways to shift the cost and risk of basic IT operations to outside vendors. These vendors are already amassing huge demand for their services and are making the investments in data centers that create economies of scale that enable lower price points. Cloud computing data centers are evolving into the factories that supply computing power, data storage, and application systems that can drive improved margin and efficiency in the rest of the global economy.

Plans to simply cut IT budgets and to try to keep operating expenses down until business rebounds won't work. If companies restrict IT operations and IT is seen and used by their company simply as a cost center instead of a strategic thread through the collective needles that make up the company's value proposition, then the company won't be able to roll out new products in a timely manner, or keep up with changing needs of its customers, or respond quickly enough to new threats and opportunities.

Hanging onto internal IT infrastructure may prove to be a losing and precipitously risky strategy, much like it was when electric power naysayers avoided the public power grid 100 years ago. Instead, a far better move will be to find ways to enable the transition to the cloud, and to move your company to a more variable cost operating model. This creates opportunities for business leaders to show their companies how to move to cloud computing along with the ways to effectively address the related performance and security concerns. When companies make this move, they will free up money and resources to invest in more of the things their customers pay them for, and they'll create the evolving stream of products that keep them connected to and relevant to their customers. This, after all, is what history proves that earns consistent profits.

This shifting of functionality to outside service providers needs to take place so that in-house IT groups can redirect their time and money to working with the business units. They need to help the

business units create real customer value with technology. All of this is similar to how social media are fast becoming another way companies spread the word about their products—and is challenging the consumption of traditional media. IT as customer support and relationship management is how modern companies need to connect with their customers and build long-term relationships. Information technology is now woven throughout so many products—like financial services, consumer electronics, smart phones, Internet applications, entertainment, and consumer services—that companies need to offload all of the routine parts of technology management so they can focus more on how to weave the technology in their products. It's simply a matter of competitive survival. Companies that apply their resources to the products that better integrate technology will win a higher share of consumers and business.

Universal access to low-priced electric power made possible by the spread of electric utilities drove a wave of innovation not only in how businesses operated but also in the products they developed. From the 1920s onward, the introduction of thousands of new products using technologies like electric motors and vacuum tubes became possible because dependable electric power became ubiquitous. As a result, how many new companies were created to build and sell products built with components like electric motors and vacuum tubes and transistors? And today, what business innovations and new products can you imagine will be created based on universal access to low-priced cloud computing power? How many new companies will be created to develop and deliver those products? We're in an era of new opportunity enabled by cloud computing.

Notes

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