

Internet news

The information technology evolution

Introduction

The ever faster technological advancements over the past few decades have enabled the enormous increase in the amount of knowledge held and manipulated in order to push forward the barriers to invention and business. People now take for granted devices that would have been unheard of, or only for the very rich, a decade or so ago, such as dvd, mobile phones and personal computers – now these are staples for the younger generation. The “ding cuisine” couch potato culture is one unfortunate by-product of a technological revolution that has moved the business world and consumerism forward in huge leaps.

However, it is important to recognise that it is not only computer hardware and software, nor the Internet, with its near instant access of encyclopaedic information on almost any subject, but technology in its broadest form that has shaped the way we do business or create research and the world that we live in today. The combination of old technologies such as microwaves and motor vehicles with the new Internet and silicon chips have helped to create the information age.

Many companies have carried out some qualitative market research and realised that a better understanding of their customer and prospect base is critical if they are to survive. This has led to a proliferation of technological offerings aimed at collecting data and utilising them within marketing campaigns as well as new channels to market. Multi-channel optimisation where the value of the customer is matched to the cost to serve is now being advocated by many, with varying degrees of success. It is only the fact that technology has allowed many of these channels to be viable, as with the Internet and call centers, which has enabled this change in the ways of doing business. However, these can often be expensive to implement and complex to manage – typically, during the 1990s building a Web site or private electronic channel could cost between \$2 million and \$10 million depending on project size, complexity and use of outside contractors (Mattern *et al.*, 2003).

It must be said that technology alone cannot make the expected improvements in

performance and a qualitative assessment is helpful. Business processes, and indeed company cultures need to be changed in parallel. One will not work without the other. A financial services firm, for example, noticed that salespeople were failing to enter information about their customers into a \$20 million CRM system because they feared losing their individual sources of advantage to others who could see the data (Bates *et al.*, 2003). This company now doubts if it will ever get value from its CRM system.

Technology allows the siting of businesses and even departments in the most cost effective places. For example, the movement of call centers to India where personnel costs are cheaper and can also save companies money via “self healing” (where the consumer and industrial appliances does self diagnostics and calls the engineer with the exact problem to be fixed). This saves time and costs, enabling support engineers to be more efficient with their time.

Commoditization is also another feature of technology infrastructures today. As with other business infrastructures such as telephones, electricity and transport systems, companies spend a lot of money on what is fast becoming a commodity, with IT vendors potentially becoming utility companies unless they find new ways of differentiation. It is likely that the knowledge workers of tomorrow will provide the differentiation needed to succeed in an ever more competitive marketplace, and a qualitative study can help to provide ways for differentiating.

Where have we come from?

So which are the prevalent technologies that have made such a difference to the business world? There are of course industry-specific ones such as credit cards in the retail and finance sectors, as well as cross-industry ones such as the laptop computer, mobile phone and, of course, the Internet. These have enabled sales forces and other types of workers across the globe to become more mobile and independent of the physical restrictions of being at the office, allowing them to spend more time with their customers and new prospects. These technologies are a

The author acknowledges the contribution of Mark Cerasale at IBM for development of ideas for the preparation of this article.

mix of information and communication, each being equally as important.

We have moved from merely speeding up current processes by computerising manual tasks such as accounting, stock control etc. (the classic BICARSA suite that now forms the core of enterprise resource planning (ERP) software), to “Martini” technology – any time, any place, anywhere! This route has, over the years, made business processes much more cost effective and efficient, and in many cases has changed the way companies do business.

New business models have had to be implemented in order to utilise technological improvements and gain competitive advantage, such as the newly announced “Pay as you drive” insurance programme from Norwich Union. This innovative venture will see data collected from a telematic device in a customer’s car and an insurance premium calculated based on when, where and how often the car is used.

The above is a classic example of innovation using existing technology to do things differently and to add value. In this case technology and expertise from IBM were coupled with communications from Orange. Technology, and especially IT life cycles, are speeding up and this is helping to increase the speed of innovation and also innovation imitation. This ever increasing momentum is driven by business needs in today’s competitive marketplace.

Other major technologies that have shaped business the most in the past are often industry specific, giving competitive edge to begin with and then becoming ubiquitous. Financial services is a sector that is often at the forefront of new technology adoption, with automated teller machines (ATMs), cryptography and on-line credit application being three of the technologies that have moved this industry forward the most over the last ten years.

Financial services is not the only area to have used major breakthroughs. The retail trade has used electronic point of sale (EPOS) scanning technology to make stock control, ordering and store replenishment much more efficient. Combining this with loyalty cards has enabled this industry to be at the forefront of the CRM wave as knowledge of their customers increases dramatically from data automatically collected at the checkouts. Manufacturing and process industries were

amongst the first sectors to embrace ERP in order to re-engineer their business processes and to gain competitive advantage. There are many other examples of the adoption of technology in order to enable change, however, each cycle of competitive advantage is not sustainable forever and the innovations quickly become the accepted technological infrastructure. Who today would expect to have a forecourt attendant fill up their car and take the money in cash? Yet, this was the norm before the advent of credit cards and computerisation that enabled the faster self-service and pay-at-the-pump service that we take for granted today.

Where are we today?

We are in the position today of having seen some large successes and failures in the IT world over the past few years. No-one can doubt the success of the Internet, but what about the whole dot.com bubble which burst with devastating results for many of the companies involved? With hindsight, the problems associated with the dot.coms are more visible, but at the time the Internet seemed to be the answer to many business issues. The existing infrastructure of people, both employees and potential customers, together with the communication bandwidth, were perhaps glossed over. Many assumptions were made – such as a customer’s readiness to purchase online, or a customer’s probability to switch – often erroneously. Many Internet start-ups were so busy collecting new customers that they did not work at keeping the ones they had, discarding the “click stream” data collected (not to mention the qualitative data from customers about how they found their Web interactions with the company). A simple business intelligence system could have kept not a few dot.coms alive. All in all this was an example of expectations being much higher than reality. The Internet has now come of age and is ubiquitous in society in many guises, technology is fast catching up with expectations and new start-ups have learned from past mistakes, so business is still moving forward using this channel.

SAP reaped the rewards of being the first mover in the ERP market with their product, which is now the core business system for many firms world-wide. SAP is no longer just ERP, but is being constantly extended to include other key solutions such as CRM,

data warehousing and of course Internet capabilities. Siebel have followed suit in the CRM arena despite the lack of investment returns that the majority of implementations suffer. This, of course, is a problem in all “flavours” of CRM, not just with Siebel. One reason for this is the enormous amount of time and resource that goes into such important applications. The integration needed is immense and often the solutions go in piecemeal with little or no communication between each area, causing problems and customer dissatisfaction which is the opposite of its *raison d'être*!

The whole company has to be customer focused in order for a CRM implementation to work. It is no use just putting in technology and hoping for the best. Technology is an enabler for better business processes and focuses, allowing new ways of doing things. It is not a universal panacea that will suddenly make bad processes better and change company focus. The lack of understanding, and therefore failure to realise expected gains from projects, has often led to technology investments being cut by the business leaders in a company. It is critical that the project teams are a mix of business and IT people so that a company-wide view is taken and all areas are understood.

Information technology has undoubtedly achieved enormous productivity gains in many areas, from business applications through to robotics and telecommuting using better and faster communications channels. Countless business hours have been saved through calls and video-conferencing rather than travelling to face-to-face meetings. This does not take away the need to meet in person, but it does cut down on the frequency of such meetings. Time is far too precious to waste, especially as the rate of change is increasing year on year. Businesses have to be agile, flexible and responsive to market demands. In order for this to happen, the correct technical infrastructure has to be in place with applications that will allow change to happen, otherwise constraints will creep in, leading to loss of a competitive edge.

A typical constraint is the use of a system that is proprietary, or otherwise does not conform to industry standards. This often means a lack of integration and communication with other systems, both in-house and along the supply chain. At best a level of complexity can cause expensive

inefficiencies. Standards are becoming more and more important as the level of electronic communications rises.

An example of problems that a lack of an agreed standard can bring is with the Internet or Web services. IT is now a commodity, a backbone infrastructure much like railways and roads that need to coexist and connect. In order to do so they need a set of defined and agreed standards that all players conform to in the same way that the railway companies of old had to abandon their own different gauge lines and adopt a common one in order to allow the smooth running of the national network.

As IT systems become more complex, the issues of integration become even more of a challenge than mere application portability. Connectivity and communications are critical today with voice, data and even video linkages becoming important, not only across mobile phone devices, but in other client devices also. Although video phones are seen perhaps as a novelty today, it will be interesting to see how they will be incorporated in business tomorrow. They may even cause more problems than they fix. Perhaps this is a technology in search of a problem, for example, copyright issues and illicit photography. However, it could turn out to be one of the next “disruptive” technologies enabling us to play “big brother” on criminals and so on. It is a technology in its infancy, but if it is to become a fully-fledged player, it will need a role to play.

Communications within an organisation are just as important as those outside. We see the intranet becoming more and more a vital backbone for companies. Internal marketing communications staff will have an important role to ensure that each employee understands the company objectives, products, competitors and customer set.

The fast pace of change means that it is often difficult to foresee how business will look in a few years time. For instance, how will we use the Internet? Will we even know that we are using it? This technology is already being embedded in many devices and it is almost certain that it will become a backbone to business in the future. Although we cannot be sure how it will be used, it is almost certain that it is here to stay in one form or other.

Despite the problems of the dot.com era, there are many companies in the B2C sector that have been spectacularly successful.

Amazon.com and e-Bay are two that spring to mind, although strictly speaking e-Bay is a C2C, but there are many others – particularly spin-offs from bricks and mortar outlets. In the B2B arena the Internet is a behind-the-scenes backbone of many companies now, acting as both an internal and external communications channel and lowering costs. It has dramatically transformed the way businesses operate internally and with suppliers, customers and partners. The Internet is an integration enabler, lowering transaction costs and making all areas more efficient and effective. In a world where timelines are important, the speed of response now possible is changing the rules of business forever.

Where are we going?

There is almost certainly going to be a continuation of constant change from the technology perspective, as innovation and imitation cycles prevail, leading to even shorter product life cycles. It is almost without doubt that we do not know today which technologies will make the most difference in years to come. Who, in 1990, would have foreseen the impact that the Internet has made?

There is now the notion of disruptive technologies. These are advancements that are so new, innovative and different that they completely change the current business landscape. Such technologies include silicon chips, the PC, mobile phones and the Internet. Each has made a significant difference to how business has progressed over the past few decades. As we have seen with the Internet, there have been some dramatic successes and some equally dramatic failures as the dot.com bubble burst. Companies that quickly realised how this new technology was going to change the face of business and which encompassed the emerging attributes that their company could exploit in their business strategy as a new channel to market – for the right customer set – were the winners.

Being quick to recognise that an emergent technology will be a disruptive one and exploiting this with the least risk to current business is one way to succeed in this environment. The dot.com failures were those that took too many risks, did not think ahead and rushed to join the bandwagon without a solid business plan. Technology,

disruptive or otherwise, is an enabler to business, even if it has far-reaching effects. Discarding the foundations in order to embrace it can be extremely risky and even disastrous to some companies.

There are technologies starting to emerge today, or at least to be discussed as future potential today, that are likely to have a large impact on business in future decades such as the wide consumer acceptance of digital currency or smart cards, intelligent application software and accepted interoperability standards. There are the as yet unknown enhancements to the innovative new technologies of today, e.g. videophones, which will undoubtedly transform areas of industry in the future.

Other areas of research today are bioinformatics, text-to-speech, on-demand and autonomic computing, which is the progression of computing to a systemic network based on biological systems intended to alleviate the complexity of infrastructure that we see today. There will be many benefits from autonomics, but the most immediate will be that of reduced costs and higher stability of IT systems due to automation. Business benefits include better management and faster reactions to market changes, enabling improved and more timely business decisions.

It is expected that many future technologies will be services rather than hardware and software, for example, new Web services and even applications such as salesforce.com etc. Services are a growth area in the digital economy and we can expect to see this highly competitive sector shake out even more in the near future, leaving just the major players along with a few smaller niche companies to meet market needs and take this industry forward, as we have seen happen in the past with the IT industry. Of course as new types of services are identified, the first movers will benefit and we shall see new players emerging to take a foothold in the new areas. One only has to look at the ERP and CRM playing fields to see prime examples of this happening.

Technology is converging and pervasive. We are all familiar with micro chips now being embedded almost ubiquitously in everyday items from children's toys and household devices, such as microwaves and washing machines. to industrial products and of course cars. Gone are the days when the

home mechanic could fix a problem. Today the car is hooked up to a computer at a dealer and the onboard management system reveals what is wrong. We all exploit technology daily at work, in the home and at leisure. The PC has become another "must have", just as TV and video systems were a few decades ago.

We are seeing technology convergence from the "4C" point of view: customer; content; communications; and computing. One example of this is the Norwich Union "on-demand" or "pay-as-you-go" insurance mentioned earlier. In this example the customer is the car driver, the content is the telematics and "infotainment" system, the communications is by Orange and the computing by IBM. This also shows how companies need to partner more and more in order to deliver the wider solutions expected today whilst keeping to their core competencies in order to deliver a high quality service.

Other areas of technology convergence are between industries and we are seeing this happen already within the biotechnology and IT industries. Pharmaceuticals are one key area for the "on-demand" computing vision of the future, where a grid of computers, as in the electricity grids or water supplies, run advanced simulation and modelling to cut down the time taken to identify and launch a new drug by less than half, saving millions of dollars in trials and product development.

IBM's vision of the on-demand era is that of customers' servers all being constantly monitored to shift workloads from machines short of resource to those with capacity to spare. This allows server farms to be run closer to capacity and excess work can be seamlessly moved to IBM's own servers for processing if needed. However, it is not just about technology, but knowledge, with IBM services personnel sharing their industrial expertise across the globe, as required. This vision demands total focus by the company on new versions of software, hardware and processes, starting with IBM itself, which will become the pilot for the on-demand strategy.

In order for all of this to happen it is critical that all of the piece parts integrate well at every level. It is not simply a matter of ensuring that the hardware and software communicates, but everything needs to be able to run optimally on everything else. Processes, business logic and data must all be

able to "fit" within the computing and business grid that is "on-demand". Never before has standardisation been so important. The so-called "open systems" of the past are not enough for the future and we are today seeing battles taking place between Microsoft and Linux for standard setting for the future. Whichever wins must be able to run on all servers regardless of scale, be robust and secure, easy to manage and be well supported by the vendor.

We can see it qualitatively, for there are many changes taking place with bright visions for future business through advanced technology, but are companies positioned to take advantage of these?

How do we get there?

There is a lot of talk about company and systems transformation in order to exploit the new innovations that are coming along, but what does this mean and can you do one without the other? In order to maximise the benefits that can be reaped from the new technological advances, old out-of-date processes and systems in the wider context need to be updated and all company resources focus to capitalise on the new way of working. A qualitative research study of such benefits can save time and money for companies in the long term by preventing them from going down the wrong road.

Take IBM as an example, which is heavily promoting the notion of "e-business" and is embracing the concept in order to lead by example. The company believes that e-business is critical for survival and prosperity in the emerging networked economy. It is this belief that is central to the transformation of IBM. This starts with the transformation of core business processes; supported by new applications and existing applications that fit, running a secure, scalable, available IT environment and leveraging the knowledge and information held as electronic data and, more importantly, within the human capital of the company. The company goals are to strengthen relationships with customers, suppliers, business partners, employees and influencers to improve customer service and loyalty to reduce costs and achieve greater efficiencies, to become more effective and increase revenue. This is done in a variety of ways, exploiting the power of the Internet

via the on-line ShopIBM, e-care for customers, partners, employees and influencers and e-procurement. All of this is heading towards the on-demand environment where the “grid” of IT facilities and knowledge workers is available when and where needed.

Other companies which are going through the transformation process may consider outsourcing their business processes to a business transformation outsourcing firm which can not only run, but can transform, a client’s core processes, infrastructure and applications to achieve superior shareholder value, leaving them free to focus on winning in the marketplace.

One thing is for sure. The Internet will continue to develop as a global infrastructure and although we do not know how we shall be using it in the future, it will be as much a part of daily life as the telephone is today.

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References

- Bates, M.D., Davis, K.B. and Haynes, D.D. (2003), “Reinventing IT services”, *The McKinsey Quarterly*, No. 2, pp. 143-53.
- Mattern, F., Schonwalder, S. and Stein, W. (2003), “Fighting complexity in IT”, *The McKinsey Quarterly*, No. 1, pp. 57-61.