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The Future is not what it used to be!

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Paper 8.6

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Abstract

The world of business has changed. The dotcom bubble may have burst, but the impact of a host of new technologies still means that firms must be on the lookout for any new competitive advantage that technology can offer. This paper examines some of the trends and some of the more bizarre technological developments which are likely to appear over the next few years. It briefly looks at what their impact could be and tries to provide a glimpse into the future.

Introduction to change – a reminder

Our world has changed. We take for granted technologies unimaginable only a few generations ago.

This ubiquity of technology has not just changed our lifestyles, it has radically affected how we do business. It all began quite slowly about 40 years ago. Routine 'back-office' activities – payrolls, accounts and billing were first to be automated closely followed by some manufacturing processes. The front-office was next, transformed with Customer Relationship Management (CRM) systems often combined with Call Centres. All converged as Enterprise Business Systems which provided Real Time Information to facilitate 'Just in Time' delivery. Supply chains became shorter and tighter and the information barriers between companies started to be realigned. New partnerships were formed as suppliers and customers merged to simultaneously become competitors and partners.

Suddenly technology was no longer just infrastructure providing traditional business functionality. Businesses were redefined by the technology. Customer knowledge became more important than traditional product. There were opportunities for reselling all along the value chain and beyond.

Electricity companies started selling telecommunications products. Gas companies sold electricity and roadside assistance. Everybody tried to sell banking.

Business would never be the same again.

Of course not everybody was delighted. Those technological changes that opened new opportunities for one business, spelt disaster for another. Even the most well established business model could be affected. Not only were the newcomers non-traditional players, but as they entered the market they tilted the playing field. By operating the business on an entirely different basis they could turn the assets of traditional business into a liability. High street banks which had prided themselves on having extensive and impressive 'customer facing' outlets suddenly discovered that they were left with the expense of servicing the 'small change' customers as the high rolling customers quickly switched to telephone and on-line banking. Airlines with expensive flexible ticketing and booking systems accessed via a complex retail distribution network were suddenly bypassed by direct selling ticketless airlines.

From Change to Disruption

This was not just change, this was disruption at breakneck speed. Technological change has always caused individual businesses to fail, but it took a long time for any change to have a major impact upon a whole industry. In traditional manufacturing the capital requirements, the 'barrier' costs of building and retooling provided a damping and smoothing mechanism so that innovation proceeded relatively slowly. Incumbents might miss the first wave, but usually they had plenty of time to react; indeed it was often a strategy to sit by and let the new entrant test the market. Missing a trick or two might depress market share for a short while and being a first-mover also had its risks.

Not so now. In service based industries disruption can happen overnight. Call Centres could be relocated from Derby to Bangalore, Design Centres moved from Detroit to Taipei and bespoke software commissioned from an ad hoc army of freelance programmers across the entire planet. Itinerant workers replaced by itinerant work.

It is not just the Internet

To many these recent and rapid changes have been exclusively associated with the internet but that is a mistake. The impact of the internet has been considerable, but it is only one agent of change. Indeed compared to the growth rate of mobile telephony, disc storage capacity and screen technologies, the growth of the internet has been relatively pedestrian. It is the combined effect of an array of technologies, themselves often leap-frogging over one another – from integrated circuits to touch-sensitive devices. All have fuelled this rapid change.

What *has* been special about the Internet revolution is that other technology changes spread rapidly and have a global impact. Innovative forms of competition can now come directly from across the planet, often unfettered by local customs and practice, rules and regulations. From airlines to entertainment, industries have been shaken to their core by the innovative adoption of a single, often simple, technology. The challenge also comes not from competitors but by complete newcomers, rank outsiders, adopting a completely different approach and unencumbered by the knowledge that "it couldn't possibly work that way".

That is why even those businesses which felt secure, in that they at least knew who their competitors were, now feel that they have had a wake-up call. They feel vulnerable to global as well as local competition. There was a time when innovation hit only those who worked in the low- and semi-skilled industries as manual operations were replaced by machines. The professionals were always safe in the knowledge that their intellectual skills could never be replaced. No longer. Now it is the professionals: the educators; the lawyers; the accountants; even the physicians who need to start thinking about the shape of their industry in ten years time. Self-service is taking on a new dimension.

What next?

In analysing future trends, it is useful to separate up and coming technologies into two groups. The first contains those which are mainly evolutionary. For example, we can be fairly confident that devices will continue to get smaller, use less power for greater performance and continue to fall in price. They will continue to shrink according to Moore's Law: halving in size every 18 months. Moore's law is confidently expected to continue for the next ten years so that devices need only be a fiftieth the size they are today. Like all other electronic devices, the Personal Computer will be wearable and smaller devices, such as phones, will be almost invisible. Video and audio devices – already very tiny – will be so cheap that in combination with radio networks, surveillance methods will be revolutionised. Traceability will

be the norm affecting everything from crime to recycling and the social issues of privacy will become of major political importance.

Communication technologies will increase in capacity – maintaining the present year-on-year doubling of basic capacity for at least another 6 years. Micropayment systems combining low transaction costs with high reliability will further transform “business to customer” and “business to business” transactions. Coupled to microsensors, products and services will not just have a fixed price, they will have a rate at a time and a place.

As microelectronics is coupled with nano-technologies the distinction between mechanical and electronic will become blurred. The first growth area is likely to be in micro-sensors. Comparable in size to – and not much more expensive than – a grain of sand, these will bring a new dimension to location based information services. Likely to emerge first in the grocery retail sector where they will be coupled with Radio Frequency Identification (RFID) tags they will not just herald the end of the barcode and the check-out, they will provide a means for recording the life cycles and temperature cycles of individual items. The packaging industry will be transformed and rubbish will have built in traceability. Ideas about recycling will themselves have to be recycled.

Nano-manufacturing may also be source of the next industrial revolution as local and ‘just in time and place’ manufacturing is again redistributed across the world. This however will be manufacturing of a different sort, for by manipulating matter at the molecular level, the devices may be made to exhibit novel mechanical properties.

Form the bizarre to the startling

The above concepts may seem bizarre but all are feasible. More startling are the consequences of the next generation of technologies such as quantum computing, bio-electronic engineering and autonomous systems. These all have a solid theoretical basis, but they cannot yet be engineered.

Quantum computing is likely to start *supplementing* conventional computing in about 15 years time. However it is so fundamentally different from current computing models that it will (initially at least) be targeted at those very special problem areas which are presently intractable such as the large searches required for decryption.

Statistical pattern recognition techniques and adaptive/learning machines are likely to re-energise areas such as image understanding, speech and voice recognition. These will go far beyond the transcription systems of today. More human-like than ever, they will take multiple sensory inputs and provide multiple outputs. Similar approaches are likely to be applied to language translation and speech technologies so that machines start to exhibit anticipatory characteristics – doing what is meant, not what is said.

Bio-electronics will allow entirely new forms of human computer interaction. Specialist devices such as cochlear and retinal implants already exist, but mass market devices may first appear in the form of nerve impulse detection. “Silent speech” where nerve signals destined to control speech organs are bypassed and used to control a speech synthesiser may be a first application. Future trains may be full of people apparently talking silently to themselves! That is if we still need to travel.

Back from the future

It is often said that predicting the future is easy; it is predicting what happens next week that is really difficult. This may be true, but it is not the whole truth. The snag is that what seems to be far fetched can swiftly turn to reality when viewed from a different and often external perspective.

That is the nature of disruption.

With so many possibilities and conflicts, creating a coherent short-term and long-term strategic vision for a business is far from easy. Techniques from technology road-mapping to full-blown “business war-gaming” may all help in providing that vision.

Many scenarios will be far from the mark and none will ever be completely accurate, but only by constantly reviewing the potential impact of technological change from different perspectives, can the threats and opportunities be anticipated, managed and exploited.

For the future is not what it used to be

and it will be different again..... tomorrow.