

IT Defining the Future Workplace

Still dreaming of the utopian workplace that was envisaged for humankind in the 60's and 70's? The age of robots and computers offering to take on the drudgery and monotony of our work environment and leaving us with copious leisure time? The concern back then was how the workforce could adapt to such a rapid increase in leisure time and whether we would all die of boredom. Well, that future didn't happen, but there are signs of what IT might deliver and what our more immediate future might hold.

New generations of digital natives

Significant changes will be driven by the new generation coming into the workforce as their world view is alien to those of past generations. This is well illustrated by the Mindset List which captures the world view of students entering college in a particular year. Some IT related items from the last few years which place this new generation are as below:

- As they've grown up on websites and cell phones, adult experts have constantly fretted about their alleged deficits of empathy and concentration.
- Their school's "blackboards" have always been getting smarter.
- Music has always been available via free downloads.
- They've often broken up with their significant others via texting, Facebook, or MySpace.
- They won't go near a retailer that lacks a website.
- Email is just too slow, and they seldom if ever use snail mail.
- GPS satellite navigation systems have always been available.
- Personal privacy has always been threatened.
- Bar codes have always been on everything, from library cards and snail mail to retail items.
- "Google" has always been a verb.
- They are wireless, yet always connected.

The workplace is virtual

A wide range of technologies is already changing our notion of 'turning up to work', and, for those who work with international colleagues, also that of 'normal hours of work'. With pervasive high-speed broadband, connecting with colleagues is possible anywhere and at any time. Internet-based telephony and video-conferencing (e.g., Skype) is already in widespread use for social communication and is fast becoming a major tool for organisations as well. This makes working from home a simple reality, and supports at least part of the original utopian hope with great flexibility in when and where work is completed. Align this with the emergence of cloud-based services for managing an organisation's documents (e.g., Dropbox), emails (e.g., Gmail, as employed for email for all students at the University of Auckland), and even analysis and simulation tasks, and the need to 'turn up to work' vanishes.

Think of the benefits to society from this enhanced mobility of the workforce. For example, less traffic on the roads will lead to a reduction in congestion, pollution, green-house gases, and even the need for expanding traffic infrastructure. Greater productivity will flow from the workforce who will have an extra 1-2 hours per day available without that tedious commute. Large technology companies in the USA, such as IBM, already report that around 40% of their workforce does not go to the office on any particular day. However, as we are social beings, there are

downsides to this trend as well. Workers feel isolated at home and tend to miss the minor social activities that take place during a normal work day, such as staff-room discussions or conversations in the lift. The sense of community, team-work, and belonging dissipate without maintenance of interactions with other colleagues. This is the direction of ongoing development in technologies for the virtual workplace.

We are seeing the emergence of both virtual and physical avatars to enable interactions which are lost with the virtual office. Virtual avatars in a virtual environment (e.g., SecondLife) allow the illusion of all participants being in the same place during a meeting. To regain the interactions lost in current technologies, avatars can be personalized and given the ability to gesture and be expressive. Some even organise work parties populated purely by avatars in an appropriate virtual setting. There is also research on physical avatars to be your proxy in the workplace. Think of a screen on a pole driven by a motorized base (e.g., Anybot's QB telepresence robot). These systems allow the remote worker to participate in meetings and water-cooler conversations with a physical presence. With your facial expressions visible and control over the speech and movement of your avatar, more 'natural' conversations can be held with colleagues.

How does the virtual workplace change the skills required of our students? Given their flexibility and adaptability to technology it would seem that they'll fit right in to this virtual workplace. However, workers need to be very motivated and organized to be able to cope with the openness of such unstructured conditions. Procrastinators could well get lost in such an environment. Self-motivation and resilience are also required, to cope with the isolation that can be the consequence of a virtual workplace.



Anybot's QB telepresence robot

The democratization of information (and expertise?)

The ownership and control of information is undergoing a very rapid transition from being closely held and guarded to an expectation of openness and availability, especially through the Internet. While this is happening everywhere think back a decade to the availability of maps and direction finding. Information was tightly held by a select number of organisations whose products had to be purchased before the consumer was able to utilize the information. Contrast that with today, where online maps are a standard free feature on all smartphones and through the Internet. Government departments are releasing their data to the populace (see the Mix and Mash competition which demonstrates the possibilities accruing from more transparent access to government data). This has also changed business models for a wide range of services available through the Internet. Wikipedia has wrested control of encyclopedic knowledge from an individual organisation to an organisation of

individuals. Similar changes are happening with music and film where, instead of a few companies controlling an industry, the ability to produce in these domains is now possible for any tech-savvy amateur. Software availability is similarly affected, especially with the work of the open-source community. Open and free versions of many significant tools have been gifted to the world by teams of passionate developers and by many large corporations. For example, the linux operating system, the Java programming language, the OpenOffice equivalent to Microsoft Office, etc.

The change that is now becoming evident in the workplace, and in the work that is undertaken, is a move to social technologies which intrinsically support the democratisation of information. In the Architecture, Engineering and Construction (AEC) domains that I research in, this manifests in a move to cloud-based systems which increases information fluidity. Information about buildings which previously would only be visible to one company on a building project is now being shared across all companies on the project through the open and company-neutral Internet systems which host the building information. The technological support for open sharing of building information provides the opportunity for better designs, as all professionals have significantly improved access to all relevant data about the building.

Workers coming into these organisations will need to be very flexible and adept at learning new skills and techniques. By accessing and learning from open sources of information, repositories of data and freely available tools, they will be able to answer questions and develop solutions with an expertise which goes well beyond their basic training. They will apply research skills to identify new approaches to problems which are appropriate to their work context, and help continue the transformation of products and tools which serve this new open market.

It is a new kind of work, fluid and turbulent

During the term of the last Labour government we had the 'Catching the Knowledge Wave' conference, which had the goal to "... examine New Zealand's future in a world where learning, innovation and knowledge will be key factors for determining the social and economic success of our nation." This is a continuing trend, with around a third of the workforce in developed nations now creating for a living. The impact of this change is that almost every manufactured product is now valued on the knowledge that is built into the product, rather than the amount of material which goes into it. Think for example of F&P's FabricSmart washing machine, or the latest release from your favourite car manufacturer. This also means that many traditional roles in organisations are morphing and blending a range of skills. So a company which made ear tags for stock now has an electronics division who design the RFID component which goes in the plastic ear tag, and a software team who write the stock management support system which is sold alongside the 'intelligent' ear tags. What we are starting to see in the marketplace is the impact of these creative workers who can apply a wide range of knowledge and skills to enhance traditional products or dream up entirely new product categories.

Although our 'digital natives' (those who have been exposed to digital technologies for the whole of their lives) are being trained for this creative era, they will have to share it with a very diverse workforce. For example, current surveys in the USA indicate that 34% of workers have no intention of retiring. Increasing globalisation means that many workplaces will combine numerous ethnicities. The creative workplace will be enhanced with workers with extensive life experience as well as significantly different world views and perspectives.

Business in an instant

Aligned with the creative workplace is a growing expectation of constant availability and instantaneous business. This trend derives from the ever increasing access to the Internet and all the services that it provides. It is estimated that there are 500,000 newcomers to the Internet every day, the vast majority accessing it from a mobile phone or smartphone. This creates a rapidly growing market which addresses potential clients and consumers on every continent. With the Internet always on, there is a growing expectation of instant response to every problem and request. Clients look for instant answers to questions, so call centres operate around the world without stop. Anything and everything can be ordered online, from books and reports which provide necessary information, to simulation or rendering services which will provide graphics and models, to consultants on any topic you require expertise, to workers for hire with specific capabilities. Think outsourcing, but at an individual level and available in the instant that you need the answer or work done.

Support for this trend is seen in the growth of cloud-based services, microbusiness models and micropayment systems. Workers with specific skills that they can market online are able to sell these on a small scale to clients anywhere in the world. Ask your most fanatical Minecraft students about who is getting paid to develop content for the game and you will discover a scattering of students around the world with unique skills selling their services to the company.

Everything is seen (but who cares?)

The intelligence which is becoming widely available within the workplace is not just static data, but real-time information on everyone and everything around you. Pervasive security and video cameras aligned with powerful feature and face recognition systems now make it possible to track much of what happens in the world. In the construction industry it is becoming possible to automatically recognize who is on site and what they are doing at any particular time. It is also possible to identify what has been constructed over the day and whether it is exactly where it should have been constructed. While this may invoke fears of 'big-brother' when utilised to measure productivity on site, it also has benefits in ensuring safety of workers in what is an intrinsically unsafe environment. Our 'digital natives' seem to be less concerned about the implications of these privacy trends than previous generations. Their open Facebook and Twitter feeds reveal a plethora of personal information for all the world to digest. So will they protest intrusive tracking systems in their workplace if it benefits their work?

This information about the world is starting to be fed directly to individuals in a very private way. Augmented Reality (AR) provides an interface to this information flow which is tailored purely for a single recipient no matter where they are (e.g., Google Glasses). The real world can be overlaid and augmented with current and relevant information tailored just for you. AR examples being developed include a contacts management system which will label every face in view with their name, company and date last contacted.

The trends discussed above try to paint a picture of a changing world which will continue to become more frenetic and virtual. The utopian dream of a leisure society freed from the shackles of work by robots and computers is at odds with all the trends seen over the last few decades. The notion of unlimited relaxation is no longer the goal, as work insinuates itself into wherever and whenever people go, and the division between personal and professional becomes increasingly blurred. What we see is a world of work no longer bounded by place, but full of excitement and possibility, where

creative people will have the ability to drive great innovation by building upon access to the world's intellectual capacity.

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