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All things are converging. We have been hearing it propounded for many years but the ordinary man-in-the-street has seen little evidence as we have to carry more and more gadgets for every element of our business. Is this now starting to change, and is this the moment for companies to take note? Convergence will have an impact on how business is done, and on customers' expectations. Some of the elements in this essay have already been taken on board by emergency services and the military. Advances continue to be made in intelligent textiles, where convergence will take on a greater role with built-in soft switch technology and where intelligent gadgetry is combined with an article such as a ski glove.

Computer convergence, communications and production automation



We have been reading about convergence for nearly a decade, but any owner of the myriad of dysfunctional gadgets needed in today's working environment will know that convergence is one promise that has been slow to emerge in any real sense. Recently things have begun to change and the Christmas 2004 shopping period was the tipping point for both business and the consumer. Curiously, the item that may have made the difference is not so much the Blackberry, which is now welded to the hand of just about every American business executive, but the little Apple iPod. This is doubly so since Apple is probably best known for an unwillingness to allow its machines to interact with other systems. Historically Apple has been the archetypal non-converger.

The underlying concept behind convergence was that, as the digital world expanded, all machines would link seamlessly together and life would become simpler and easier. Instead, everyone has been carrying more little bits of computer-based hardware, each containing lots of functions that are only partly utilised.

Breaking new ground

The most obvious development of the last two or three years has been the convergence of telephony and photography. Mobile phones now function as cameras and are instantly capable of transmitting pictures around the world. The overall transfer of photography from film to digital media has been one of the fastest changes ever. The Blackberry, already mentioned above, has also been important in terms of giving executives on-the-go access to email and voicemail. It is interesting to note that the first photographs of the disaster sites that would be facing emergency crews in the July 2005 attacks on the London Underground came from hand held camera/telephones.

In many parts of the world both television and radio are moving into a digital format, making them both easier to record and manage. The user gains control of a wide range of written, picture, sound and video media, plus the ability to broadcast them in many ways on different devices. Add to this the speed of uptake of broadband and WiFi which allow consumers and travellers to have access to relatively low cost high speed Internet connections and the overall convergence in the fields of communications, photography, media management and entertainment becomes apparent.



Blackberry

What it all means

So what is happening with convergence is not so much that the consumer will carry around one little gadget which can do everything—although

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sometimes it may feel like it—but rather that every bit of equipment will become interconnected in a hopefully useful and sensible way. Individuals will be continuously on-line in different forms and the physical items they use and wear will increasingly be an integral part of that connectivity.

At the same time, it is also accepted that things need to be simple for users and all the complex 'plumbing' that makes this convergence happen must be hidden from them. Technology now permeates every aspect of business and digital communications are the core. New technologies are announced almost every day and choices can be complex and confusing:

- Mobile phones that are integrated communications devices
- Digital switchboards that can provide caller information and are beginning to integrate with web for fax and voice over IP (VOIP)
- The growth of different communications standards such as Broadband, WiFi, Bluetooth and GPRS
- Websites that have live links into the business process, the servicing requests from customers, suppliers and staff on the road.
- Rapid convergence of production and process automation in our modern industrial world.

Plotting the development of technology over the last three decades has seen a number of watersheds: the advent of the PC, the development of an operating system standard (MS Windows), the commercialisation of the world wide web and the rise of the mobile phone as a must-have device. However, the business community has struggled with understanding the new technologies and deciding which systems to back.

Age makes a difference

This is not helped by the fact that many of the naturally older people who hold the top jobs in industry are the least comfortable with the new technology.

The Economist newspaper recently defined society as breaking into three groups. Analogues constitute by far the biggest group and have great concern about getting involved. Digital converts come next, while the young constitute the digital originals. They use the Internet as the first source of information, the text message or email as the main method of communication and are not fazed by equipment and software that regularly fails to work as expected. Analogues make up about 70% of society and are mostly in the older age ranges.

The young digital originals (see Table) are important pointers to the future both in terms of how business might look as well as how consumers will behave. Both aspects are vital for product developers to understand. These are consumers who have probably read few books by the time they reach 18 but have been prolific users of SMS text messages. Classed as Digitally Literate they can be considered — Always on, Mobile,



Kodak

Experiential and Community-oriented. The Internet is their primary communication tool. According to NetDay (2003) of this group:

- 81% email friends and relatives
- 70% use instant messaging to keep in touch
- 56% prefer the Internet to the telephone.

They frequently watch TV simultaneously with surfing the Internet, are not interested in conventional advertising, but do participate in a good viral marketing campaign.

Increasingly, we need to anticipate the future expectations of consumers and employees who are digitally literate. They may not define themselves as computer minded or technical, but they will be using many digital tools in a wide and perhaps unexpected number of ways. And they will increasingly expect higher levels of customer service, immediacy, customisation and choice. This will in turn involve expectations of good quality self-service for those accustomed to buying on-line.

Further implications

Many organisations now extend computing technologies such as personal digital assistants (PDAs), 'smart' mobile phones and other handheld computing devices to extend 'the office' wirelessly to employees' briefcases, shirt pockets, cars and homes. Even within the organisation itself, computing technologies such as intranets entice various sub-units outside the traditional IT function and, even individuals, to become involved with 'their own' implementation activities. Research in this direction has indicated that ubiquitous computing enables individuals to switch freely and easily between work and private use contexts. This is seen to be an environment where interconnected computing devices allow enhanced use, while at the same time remain transparent to the user. This makes the point that the gadgets are not just joining up and the individual not just always connected, but that the way we do things and use things is changing.

When computerisation is added to a system you do not get computerisation plus the system, you get a new system. This is an important point that was raised in the 1990s and not always fully understood. Yet when many business tasks are done collaboratively by people using computers we are now starting to think about a market-based workflow scheduling as optimisation of workflow,

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where individual members of the team actually bid for the work.

When Kurt Lawton looked at the US farm industry he saw how five areas and their concurrent evolution and overlapping elements in use were changing the nature of the business. These five he identified as GPS, biotechnology, improvement in weather satellite accuracy, the Internet and the mobile phone.

Looking forward Mike Boehlje's of Purdue's Center for Food and Agricultural Business observes that the simultaneous evolution of IT and other technologies, or convergence of them, will have profound implications for agriculture. "When you combine biotechnology with information technology with process control technology, you'll get some truly Big Bang stuff," Boehlje states.

Looking at general manufacturing when every item, perhaps even, components, will be connected to the Internet via an embedded RFID tag or other such device we will be able to communicate with our products remotely. This will have an impact with production but also with end user situations, when a maker will be able to talk to an automobile, for example, without the involvement of the owner.

In simple terms we can say that "the convergence of information and communications technology has enabled the unmanned factory and office of the future to become a reality". Management control is enhanced, flexibility is increased, and negotiating with suppliers is strengthened. Supply networks are much more easily managed, and stocks should come down both within and without the factory. Concurrent engineering can be used to involve a network of internal and external, or remote staff, to speed the new product development process, and computer integrated manufacturing can be introduced. Some of these may appear doubtful or mixed blessings, but there is no doubt that when well managed they help management of a business to move from high volume production of commodity priced articles to the economic production of smaller volumes at higher value more suited to the current market place.

Few inventions lead to the expected outcome and there will be as many unimagined results from convergence as there will be simple solutions to communications problems. One aspect is personal freedom. The 'always-on' individual can always be found. Good in an avalanche but is it what we want in everyday life?

Dr. Oblinger, Manager, Academic Programme and Strategy for the Higher Education division of IBM North America, notes that by the age of 21 these new consumers, and potential employees, will have spent 10,000 hours on video games, have sent 200,000 emails, spent 20,000 hours watching TV, and 10,000 hours on cell phones. All this while having spent under 5,000 hours reading. She prepared a little table to tell us more about this developing societal group.

	TV Generation	*PC Generation*	*Net Generation*
Web	*What is it?*	*Web is a tool*	*Web is oxygen*
Community	*Personal*	*Extended personal*	*Virtual*
Perspective	*Local*	*Multi-national*	*Global*
Career	*One career*	*Multiple careers*	*Multiple reinvention*
Loyalty	*Corporation*	*Self*	*Soul*
Authority	*Hierarchy*	*Unimpressed*	*Self as expert*

To these new citizens convergence is an assumption and they do not need to be told definitions of ubiquitous computing, wearable computers or convergence. They expect and anticipate all this.

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