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# Before we rush to declare a new era

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In America they are building a new kind of kaleidoscope. On the move, you pull it from a pocket, look through its magnifying glass and read incoming faxes like sheets of A4. The pager of the future, we are told, will be an extra eye. In America they are also building a new kind of camcorder. It digitises scenes, memorises them on a hard drive, then plays them, ready for direct manipulation, on home PCs. With this extra eye, the user is not just a cameraman, but a film editor too.

To many users of Information Technology (IT), extra eyes could be just as important as information super-highways. Certainly highways represent merely one application of IT among many. Before we rush to declare that humanity stands on the brink of a new era based on highways, then we should pause for thought. After all, other IT breakthroughs have also been the subject of high hopes in the past.

Right up to the early 1990s, many commentators still felt that factory IT heralded a new era of 'flexible specialisation' in manufacturing. Assisted by robots, even relatively small firms could for the first time profitably exploit low-volume, niche markets. Robots, helped by barcode scanners at retail checkouts, would enable firms to respond flexibly to market changes. By churning out only popular lines, or by assembling new models themselves based on computer-aided designs,

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robots and all the rest of IT would broadly allow the 'mass production of individualised products'.[1]

In fact the robots are crawling, not coming. By the year 2000, human beings will still outnumber the world's industrial robots by 6000 to 1.[2] Yet the worst thing about robots is not their modest penetration, but what they tell us about technological determinism in its contemporary guise.

### High hopes in the highways represent a narrowing of horizons

Memories, so large in chips nowadays, are short in society. People forget how many times we have been here before with IT. For 30 years, the *technical potential* of IT has often, if not always, been undeniable. As a result, IT has frequently chalked up impressive achievements – from Telstar to the VCR. However, while information superhighways will undoubtedly have some impact, the realisation of their true potential could well be frustrated by wider *social and economic constraints.*

To encourage stock markets, technology and entertainment suppliers have already talked up a superhypeway of hopes. The public has been more sceptical. Still there remains an undercurrent of approval for computers, and thus, possibly, for superhighways (Chart 1).

The problem with highways, then, is not 'technofear'. The problem is that hype about highways reveals a very narrow set of horizons about the future of society.

One of the major post-war applications of IT was to put a man on the moon. By contrast, video on demand, one of the major applications of superhighways, is designed to obviate the short walk to Blockbuster Video. In the 1980s, critics at least foresaw an era in which consumers might eventually design their own durables. In the more recessionary 1990s, expectations have come down. All that is held out to us is a world where we can stare at screens all day, communicating, computing and indulging in 'edutainment': not making things, but rather Crusing the Net.
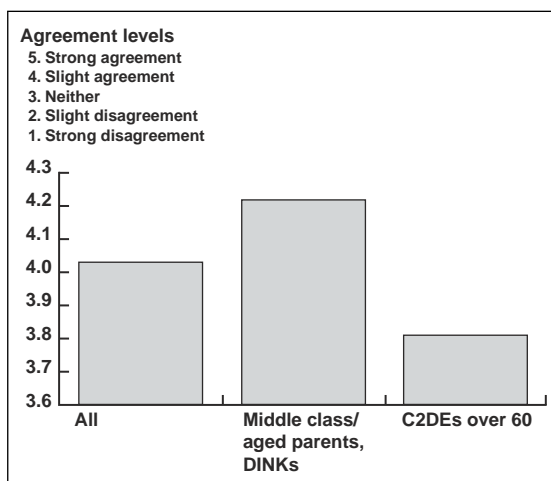
**Agreement levels**
  5. Strong agreement
  4. Slight agreement
  3. Neither
  2. Slight disagreement
  1. Strong disagreement

*(bar chart: y-axis from 3.6 to 4.3; bars for "All" ≈ 4.02, "Middle class/aged parents, DINKs" ≈ 4.21, "C2DEs over 60" ≈ 3.81)*

**Chart 1**    The popular climate for superhighways in Britain.

So even in It there has grown up a complacent culture of diminished ambitions – a culture of limits. We are told to celebrate, or to fear:

- couch potatoes who shop by remote control and are always in when, magically enough, the home delivery boy arrives on time
- energetic cyberpunks who reply to mass junk e-mail ('Spam') with abusive e-mail ('Flames')
- computer games named *Chaos Engine*, *Colonisation*, *Dark Forces*, *Doom*, *Hell Cab*, *Quarantine*
- computer nerds in anoraks; on-line gamblers; international pornographers; electronic voters; unseemly viruses, and dangerous invaders of personal privacy, commercial secrecy or national security.

Ironically enough, then, highway hype misses out on 'user-friendliness'. In practice it denigrates human beings and their talent to change the real world.

## A brief history of hype

Illusions about information run deep. Charles Handy believes that, in business, Information, when multiplied by Intelligence and Ideas, amounts to Added Value: $I^3 = AV$. The Tofflers believe that a world of neatly defined nation-states is being replaced by a kind of 'global computer'. Yet all this is hardly news. Here are some of the major fanfares about information since the birth of the integrated circuit in 1959 (Table on p. 23).

IT does not herald a new social system. In the long view, IT is but a development of inventions first prompted by the growth of the world economy in the late nineteenth century. Then, in what Harvard's James Beniger dubs the Control Revolution, typewriters and telegraphs came

## Just a small selection of post-war theories of the future

| Date of Publication | Author | Key concept |
|---|---|---|
| 1962 | Machlup | Knowledge economy |
| | McLuhan | Global village |
| 1969 | Drucker | Knowledge economy |
| 1971 | Touraine; Bell | Post-industrial society |
| | Toffler | Superindustrial society |
| 1977 | Evans | Electronics revolution |
| | Porat | Information economy |
| 1980 | Toffler | Third wave |
| 1982 | Kahn | Post-industrial economy |
| | Naisbitt | Information society |
| 1989 | Zuboff | Age of smart machine |
| | Feigenbaum et al | Expert company |
| | Gilder | Global quantum economy |
| 1994 | Business Week | Information revolution |

*Source*: Beniger (1989), The Henley Centre Media Futures study 1994/5.

into their own because of the need to control the accelerated flow of goods brought about by steam-powered factories and locomotive.[3] IT also grew up as a symptom of changes on the demand side. Since modern mass production first overtook the Industrial Revolution, firms have needed IT to guide them through markets ever more competitive, changeable, diverse and distended.

As the telegraph has given way to the tickertape, telex and video-conference, so new critics have discovered that IT, in its different forms, is the key source of modern wealth. Indeed IT is now assumed to be almost omnipotent. With the end of the Cold War and the collapse of orthodox economics, the roles assigned to capital and labour in traditional accounts of economic growth are no more. Instead, the comfortably neutral framework of knowledge, information and IT comes to dominate analysis.

That framework has some distinctly irrational components to it. The mystical aura that now surrounds superhighways contradicts the reality of straitened consumer and corporate markets for them.

## A weak market among consumers

Penetration of IT-based services in the home is modest. America, for instance, barely uses on-line services to conduct transactions.

**Malls beat mice**

| Shopping medium | $bn annual sales |
|---|---|
| All US retailing | 1500 |
| Catalogue shopping | 53 |
| TV home shopping | 2.5 |
| Interactive on-line shopping | 0.2 |

*Source*: Forrester Research (1994).

In Britain the popularity of computer games, an important surrogate for superhighways, is limited to youth, and to youngish parents (Chart 2).

Until youthful users of computers grow up, most people will, for most of the time, be unable to use Britain's installed base of IT to the full. Even regular users of IT are, after all, often unaware of the complete range of functions on the machines in front of them. Meanwhile there is an ageing, often female population of *non-users* of IT. Just as young boys play with computer games more than young girls, so taking money out of simple cash-point machines is a minority pursuit among older people, and especially among older women (Chart 3).

Alongside age as a constraint on the use of IT, there is income. In the past it was the working class which first bought monochrome TVs, colour TVs and VCRs in volume. However, differentiation by income has for the past decade been on the increase. In the uncertain economic environment of the future, the penetration of superhighways in British households may never exceed 40% – roughly equal to CD players in British households.

## A vexed market in offices

Like mobile phones and multimedia now and Virtual Reality some years hence, superhighways may meet corporate demand before they
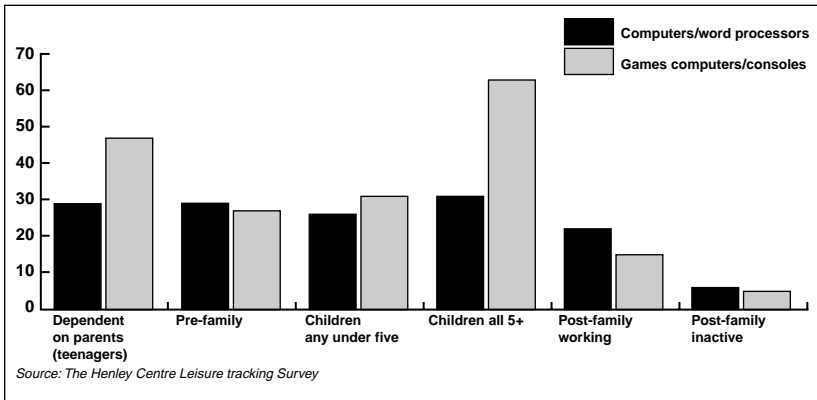
Source: The Henley Centre Leisure tracking Survey

**Chart 2** The Sega generation.



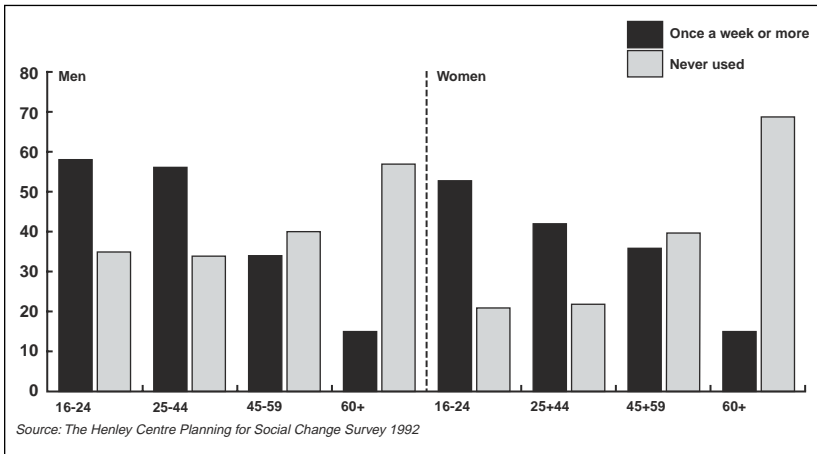Source: The Henley Centre Planning for Social Change Survey 1992

**Chart 3** The technologically disenfranchised: How often do you use a cashpoint machine?

reach the consumer sector. With teleshopping and information services, the executive user looks a better bet for highway suppliers than do people at their leisure. It is notable too that private satellite and cable-based 'business TV' networks have won adherents as varied as
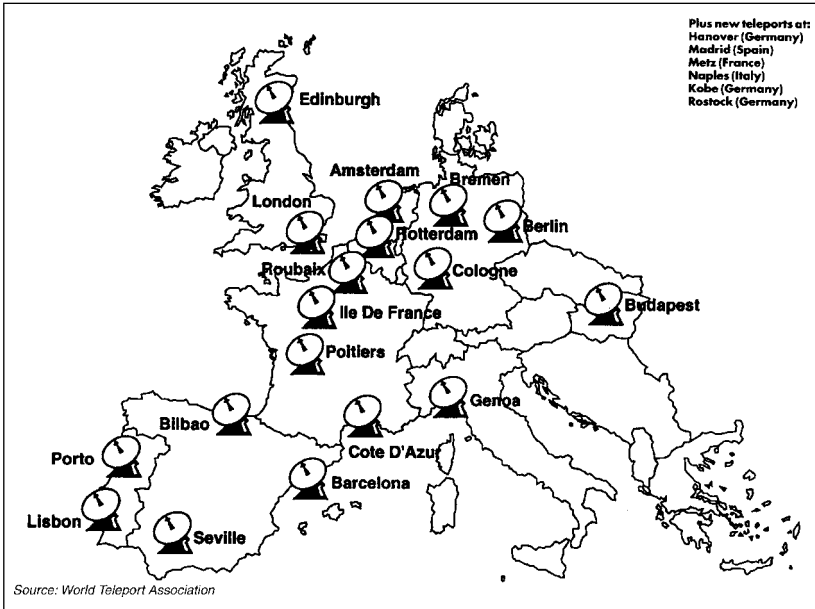
Chart 4    The spread of corporate superhighways.

Wal-Mart in the USA and National Power in Britain. Indeed in Europe there has been a conspicuous spread of teleports (Chart 4).

However, the jury is still out on the precise productivity benefits of superhighways. US government statisticians believe that their country is experiencing a boom in productivity because of IT. But there is counter-evidence to consider:

○    since early 1991, US outlays on business equipment, in current dollars, have risen only 34% – the lowest amount for any US recovery since 1960s

○    because PCs are scrapped rapidly, net investment as a share of America's GDP is way down on the levels achieved in the 1960

○    US government statisticians insist on treating PCs and laptops as equal, in power, to 24-hour number-crunching

> mainframe computers – when in practice they are used less frequently, and then often for simple word processing applications.

In short, the corporate sector could well find that superhighways offer dubious advantages for still considerable purchasing costs. In particular small firms, which today are heralded as key to economic recovery, may turn their attentions elsewhere. A highway is one thing; a £400 colour inkjet printer, with which to make old-fashioned hard-copy invoices, could be a much better investment.

Of course, through repeated rounds of IT-assisted Business Process Re-engineering, productivity at the screen can be made to rise. But then, as the eminent Swiss ergonomist Etienne Grandjean has observed, 'human labour is intensified'.[4] The superhighway, being global, will make for longer working hours, as firms increase their exposure to international time zones. Companies will anyway want to realise their highway investments quickly, and so will have them used as much as possible.

Again and again since the early 1960s, management writers have looked forward to organisations being more flexible, because less vertical in their internal structure, processes and mentality. Yet hopes have not been fulfilled. For employees in the PC-based, decentralised office of the 1990s, autonomy, flexibility, 'empowerment' and even team-based working have often meant having to take on new and more complicated tasks, as well as having to make more decisions per minute. The performance of employees with such tasks and decisions is also supervised more intently – and, through IT, more easily – than ever before. Superhighways, then, could *add* to stress at work. Note, for instance, that pilling up a stack of hostile e-mail memos on a colleague's screen has already emerged as a fine way of conducting office politics.

## The chimera of 'convergence' on the supply side

Talk of 'convergence' between consumer electronics, computing, telecommunications and entertainment is nearly 20 years old.[5] Since then, progress has been grindingly slow. Multimedia, for example, has taken a decade to reach mass sales in America.

Why does convergence proceed so slowly? In terms of IT suppliers, the consumer electronics and computer industries are unregulated, while telecommunications firms, though operating in more liberalised commercial environments, are still regulated. Joint ventures with telecommunications companies as partners, therefore, often come apart in a clash of corporate cultures.

A second factor is that the pace and direction of change in computing often lays even specialist computer manufacturers low. So to combine successfully, in one firm, both computing and telecommunications skills is often an impossible feat.

The vertical integration between consumer electronics firms and entertainment providers – between Sony and Columbia Pictures, or between Matsushita and MCA – has also not been a success. Finally, like the consumer electronics and computer industries, telecommunications firms are under pressure on prices and margins. For them, investment in high-bandwidth networks remains a big, risky bet. The precise services which would be compelling and profitable enough to justify such a network are still far from defined. Meanwhile, even mixing optical fibre with coaxial cable means that wiring up 1.5 m California homes for superhighways would cost $800 each. That is cheaper than a fibre-only connection, but still expensive when compared with cable TV and conventional telecommunications links:

| Cost per home of connection | $ |
| --- | --- |
| Cable TV to a new residential community | 370 |
| Narrowband telephony to a new residential community | 570 |
| Superhighway with coaxial cable to 1.5 m California homes | 800 |
| Fibre only to a new residential community | 1760 |

*Source*: RAND Corporation (1992), The Henley Centre.

Apart from economic impediments, there are also barriers to convergence in the form of conflicting technical standards.

'Standards' in computing revolve around no fewer than 50 different hardware platforms, operating systems and graphical user interfaces. Companies and countries use technical standards as a competitive weapon. One supplier firm or nation and its standard can be on the up for a time, but not for ever – competition will see to that. Given, too, the scale of investment already made in distinctive IT systems, neither client firm nor client nation likes to go over to new standards in a hurry.

Even in multimedia and in games there are standards wars:

○ Philips' CD-I is based on 8-bit microprocessors
○ Super Nintendo Entertainment Systems run on 16-bit microprocessors
○ In 32-bit, cartridge-based machines, Sega's Genesis 32X upgrade is poised to slug it out, from the spring of 1995, with Nintendo's 32VR, a different system rumoured to include virtual reality
○ In 32-bit CD players on the Japanese market, Time Warner's subsidiary, 3DO, has worked with Matsushita to ship more than a million machines: Meanwhile Sony will launch a separate format at Christmas with PlayStation, which boasts 3D graphics
○ Nintendo has teamed up with Silicon Graphics International to launch, in 1995. Ultra 64, a 64-bit cartridge-based system incompatible with all previous formats.

Standards functions as an obstacle to convergence. As far as users are concerned, they make incompatibility a way of life. The promise of superhighways is universal access to a seamless garment of world information. Whether highways indeed prove to be so simple remains to be seen.

Great claims have long been made for IT. Now they are being made for superhighways. They may, however, never be realised. Demand constraints at home and in the office, together with industrial, economic and technical constraints among IT suppliers, could see to that.

More disturbingly still, it is by no means clear that dreams about superhighways are worth dreaming. As we have shown, such dreams can speak of narrow horizons – of a vision which, expansive though it is in rhetoric, is fundamentally cramped. Sometimes nightmarish, fre-quently myopic, dreams about superhighways forget the old computer adage: Rubbish In, Rubbish Out. It is human beings and human inputs, not inanimate highways, which will determine the fate of the Earth.

# Notes

1.  Michael L. Dertouzos, 'Communications, computers and networks'. *Scientific American,* September 1991, pp30, 36. See also Thomas W. Malone & John F. Rockart, 'Computers, networks and the corporation', ibid. For 'post-Fordist' theories, see M. Aglietta, A theory of capitalist regulation, New Left Books, 1979;

    Alain Lipietz, *Mirages and miracles: the crises of global Fordism,* Verso, 1987, and Stuart Hall and Martin Jacqes, *New times: the changing face of politics in the 1990s*, Lawrence & Wishart, 1990. The classic text of flexible specialization, whose fondness for the textile firms of northern Italy is still popular, is Michael J. Piore and Charles F. Sabel, *The second industrial divide,* Basic Books, 1984.

2.  Figure derived from United Nations, *World Industrial robots 1994: statistics 1983–93 and forecasts to 1997*, October 1994.

3.  James Beniger, *The control revolution,* Harvard, 1989. The works cited are Charles Handy, *The age of unreason*, Business Books, 1989, and Alvin and Heidi Toffler, *War and anti-war: survival at the dawn of the 21st century,* Little, Brown, 1993.

4.  Etienne Grandjean, *'Ergonomics at the interface between man and machine',* in Gianni Barbacetto, *Design interface,* Arcadia Edizioni, 1987.

5.  Two French authors elided telecommunications and 'informatics' (computers) into the neologism telematics. See Simon Nora and Alain Minc, *The computerization of society: a report to the President of France*, MIT, 1980, first published in 1978.