# Technology might be the answer if we understood the questions

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## 0.1. Resumen

Justamente ahora que comenzamos a plantearnos seriamente la sociedad de la información y la gestión del conocimiento, las presiones del mercado y de la tecnología militan en contra de la transformación de la información en conocimiento y del conocimiento en sabiduría. Estamos en peligro de perder nuestra ruta si no reconocemos el lado oscuro de la tecnología y minimizamos sus efectos, y si ignoramos las dimensiones humanas y sociales de los sistemas de información que estamos construyendo y que resultan de una complejidad siempre creciente.

**Palabras clave**: Tecnologías de la información. Conflictos sociales. Factores humanos. Conocimiento social. Información social.

## 0.2. Abstract

Just as we begin to talk seriously about the ‘information society’ and ‘knowledge management’, commercialism and technology push are tending to militate against the transformation of information into knowledge, and knowledge into wisdom. We are in danger of losing our way if we do not recognize the ‘dark side’ of technology and minimize its effects; and if we ignore the human and social dimension in the increasingly complex information systems which we are building.

**Keywords**:Information Technolgies. Social confilcts. Human factors. Social knowledge. Social information.

## 1. Introduction

Though it is a great honour to be invited to give the opening paper at IBERSID ’98, it is also a somewhat daunting experience. At one end of the literary spectrum is the academic paper full of profound thought and authority, in which

| Milestones | Years ago |
|---|---|
| Homo Sapiens | 600,000 |
| Speech | 45,000 |
| Calendars | 35,000 |
| Wheel | 5,500 |
| Alphabet | 3,800 |
| Greek science | 2,600 |
| Paper | 1,900 |
| Abacus | 1,800 |
| Printing press | 550 |
| Telephone | 120 |
| Computer | 55 |
| Internet (browsers) | 4 |

*Table 1. Milestones in Man's Evolution (Calder, 1984)*

each argument follows the preceding one in a logical progression towards an impelling conclusion. Coming from the field of management consultancy, I hesitate to even attempt such an ambitious task. Instead, I have chosen to present a kaleidoscope of a paper; a series of related points concerning technology, particularly information technology, and the somewhat threatened position of today's librarians and information scientists. The objective of the paper is to demonstrate that our ability to survive will depend, to a large extent, on our understanding of the wider contexts of our work as professionals and our lives as citizens in the so-called information society.

## 2. Historical perspectives

Table 1 shows man's progress from Homo Sapiens, 600,000 years ago up to the sudden expansion of the Internet some four years ago with the advent of browser technology. We have had that fine piece of technology, the book, for over a hundred times longer than the Internet; and the telephone for .3% of the time we have manipulated speech (though it has been estimated that some 50% of today's global population have never used a telephone). In popular terms we

| Revolutions | Years ago |
|---|---|
| Farming | 18,000 |
| (Steam Energy | 277) |
| Industry | 198 |
| Information | 55 |
| (French Revolution | 209) |

*Table 2. Revolutions (Calder, 1984)*

talk about three major developments in man's evolution as the agricultural, the industrial and now the information revolutions. Table 2 puts these into perspective.

### 2.1. And computing technology appears to be developing exponentially

In 1970 the 4004 machine had 2,300 transistors, whereas by 1993 the Pentium had 5,500,000. It has been forecast that by the year 2006 the PC will have between 300 and 400 million transistors and be capable of effecting two billion instructions per second. The U.K. telecommunications giant, British Telecom has predicted some of the technological innovations likely to arrive within the next 40 years. Table 3 presents a selection from the list, culminating in the alarming prospect of an artificial brain in the year 2035. The major question facing society here is whether we will be able to cope with, and adapt to, this accelerating technological change: "Young people now love luxury; they have bad manners, contempt for authority; they have become tyrants in the household; they contradict their parents and tyrranise their teachers." This quotation has been attributed to Socrates, speaking some 2,500 years ago, and it is difficult to know whether to feel encouraged that matters are no worse today, or to reflect that human nature does not change very much or very quickly. Certainly, the plays of such writers as Sophocles and Aristophanes are still capable of telling us things about ourselves.

## 3. The dark side of technology

It is futile and foolish to oppose technology and to think that we can turn the clock back to some previous (and largely mythical) age. The pursuit of technology is in the nature of man, just as is the urge to enhance our lives with art.

| | |
|---|---|
| 2005 | Computers which write their own software |
| 2007 | Smart clothes that alter their thermal properties |
| 2010 | Robotic pets |
| 2017 | Human knowledge exceeded by computer knowledge |
| 2020 | Regular manned missions to Mars |
| 2030 | Use of human hibernation in space travel |
| 2035 | Artificial brain |

*Table 3. BT Technology Calendar (a selection) (Radford, 1997)*

However, we would be equally foolish if we did not recognize that there is a 'dark side' to technology, and in doing so, we should:

- Accept that there will be disbenefits and do what we can to minimise them.
- Adapt to the new technologies without becoming subservient to the machine.
- Not allow human skills and humane behaviour to be eroded.
- Avoid what might be called 'technological hubris'.

  This is, the belief that we can control our ecosystems and not upset natural balances (seen in the use of the pesticide DDT and its later banning in deve-

| Murders using handguns in 1992 | |
|---|---|
| Australia | 13 |
| Britain | 33 |
| Canada | 128 |
| Japan | 60 |
| Sweden | 36 |
| Switzerland | 97 |
| U.S.A. | 13,220 |
| In 1991, in the U.S.A., the number of people killed by firearms in homicides, suicides, and accidents was 38,317 —more than 100 every day. | |

*Table 4. Deaths involving handguns (Herbert, 1994)*

| **The production of a single 6 inch silicon wafer used for computer chips requires the following resources:** |
|---|
| 3,200 cubic feet of bulk gases |
| 22 cubic feet of hazardous gases |
| 2,275 gallons of de-ionized water |
| 20 pounds of chemicals |
| 285 kilowatt hours of electrical power |
| **And produces the following byproducts:** |
| 25 pounds of sodium hydroxide |
| 2,840 gallons of waste water |
| 7 pounds of miscellaneous hazardous waste |

*Table 5. Silicon wafer production (Rushkoff, 1997)*

loped countries; and now Microban, a bactericide embedded in household goods such as food packaging and upholstery, which some scientists warn will also kill beneficial bacteria, thus making us more susceptible to other complaints).

Consider, for example, the motor car which is now such a part of everyday life that it has been estimated that 40% of the developed land of Los Angeles is devoted to transportation facilities for cars, trucks and buses (Kling, 1996a). Apart from pollution and the misuse of cars for crime, we have to tolerate the enormous toll of deaths and injuries. The year 1996 was the 100th anniversary of the first car road death. Since then, there have been about 500,000 deaths and 30,000,000 injuries. Deaths involving handguns are even more terrible, as can be seen from Table 4.

Whereas the car demonstrates clear benefits, it is harder to make a case that the benefits outweigh the disbenefits regarding handguns; and while the argument still rages in the U.S.A., the Blair administration has banned them in the U.K.

### 3.1. The dark side of information technology

It must also be the case that information technology has a dark side, though because it is even more ubiquitous than the car, and so much more pervasively woven into our economic, technological and social environment the disbenefits are harder to identify and measure.

There are the obvious ones relating to ergonomic problems, such as Repetitive Strain Injury, and back or eye strain; and Rushkoff (1997) has drawn attention to a little-known pollution problem in the manufacture of computer components. Table 5 shows what materials are required for, and what by-products result from, the production of a single six inch silicon wafer used for computer chips.

These are physical disbenefits which can be specifically and individually addressed as, to some extent, can social ills such as Internet pornography and paedophile rings, data privacy, hacking and spamming; but there are other social consequences that are harder to understand. Hutton (1997) discussing the economic situation in Australia has this to say: "The decline in manufacturing employment is more accentuated in Australia, now representing less than 25 per cent of all employment –and even mining and agriculture employs little more than 5 per cent. This is a service economy where intellectual property is more important than large factories, and which has generated no net growth in full-time jobs for nearly a decade. There is the cohort of highly paid workers in the knowledge and information industries —but then there are the myriads of new, insecure and casualised forms of employment in everything from tourism to education."

At the information systems level, Donegal (1997) in a brief newspaper article, has suggested that by the year 2001, one in 50 of us will be working in a call centre where hundreds of people take calls from customers on behalf of their employer. The establishment of computer-supported call centres has recently become big business. The scenario is that the call centre can be situated anywhere, thus minimising the costs of accommodation; can use lower grade staff supported by computerised systems, thus reducing the wage bill; and can re-route the calls as required. There is even talk of dispensing with the majority of call centre staff when the computers can be progressed to provide answers to questions, following detailed "if….then" algorithms.

As Haywood (1997, p.479) has remarked: "Networking is about maximising returns by remote communications; therefore, we should not be surprised if it makes us more remote from each other." Social isolation, through unemployment or the exclusive use of telecommunications for personal contact must be counted as disbenefits. However, information technology, by itself, is not the only driving force behind these developments; though it is usually related to, or a tool of, other drivers.

| **THE TOP FIVE** | | |
|---|---|---|
| Rank | Company | Annual revenue millions |
| 1 | Microsoft | $11,358 |
| 2 | Oracle | $ 5,684.3 |
| 3 | Computer Associates | $ 4,040.2 |
| 4 | SAP AG | $ 2,393.2 |
| 5 | Novell | S 1,374.9 |
| **Countries with the top 50 software companies** | | |
| U.S.A. | | 40 |
| U.K. | | 4 |
| Germany, Canada | | 2 each |
| France, Holland | | 1 each |

*Table 6. The leading software companies (Anon, 1997)*

## 4. Commercial pressures

It was announced recently (Anon, 1998) that the Information Technology industry in the U.S.A. has now overtaken both the motor manufacturing and oil industries to become the largest contributor to the Gross Domestic Product.

Table 6 provides a view (as at 1997) of the leading software companies, which clearly illustrates the dominance of both Microsoft and the U.S.A.; and at the time of writing of this paper, it is interesting to follow the latest developments in the legal battle between the software company and the United States Department of Justice concerning the alleged abuse of the former's monopoly position. It should be understood that to be a monopoly is not, in itself, illegal; and what is at issue is the charge that Microsoft is illegally misusing its monopolistic power in one area to create a monopoly in another. There are two aspects to this monopolistic situation : first, the sheer size of Microsoft and second, its globalization. Regarding the first aspect, an economist has come up with an intriguing new theory. Brian Arthur, as reported by Vulliamy (1998) has suggested that the so-called 'Law of Diminishing Returns', a standard view of economic theory, may no longer hold true. This law proposes that a monopoly is challenged naturally by competitors entering the market and forcing the monopoly to compete with reduced profits. Arthur "wondered what would happen if a firm that got ahead gained further advantages over the competition merely by doing so (…) creating increasing returns (…) by a bandwagon effect." Arthur went on to illustrate his proposition with the example of the hi-tech industry where he said that "expansion to the point of domination was possible because people need to be compatible with the rest of the world." This leads to "lock in" and "winner takes all", two features which, he says, characterize the position of Microsoft.

As for globalization, Newman (1998) has discussed Microsoft's international situation; and claims that whereas the company generates about $500,000 in revenue from each employee in the U.S.A., it generates almost double that figure from every overseas employee. Moreover, sales are growing 50% a year in places like Africa and the Middle East and doubling each year in China. It may not be surprising, then, that Microsoft faces governmental legal action in many countries, as well as from the European Union. The results of these actions are likely to have a profound effect on the whole technological environment, and on the balance of power between the private and the public sector.

In this latter respect, it may also be salutary to reflect on the apparently diminishing power of national governments. Hutton (1998) observed recently that "the merger of Daimler-Benz and Chrysler, creates £80 billion of revenues, exceeding those of 11 members of the Organisation for Economic Cooperation and Development"; while Vidal (1998) has reported that "thirty years ago, nearly half the revenue of the [U.S.] federal government came from taxes on corporate profits. Today it is about 11 per cent."

The social effects of the twin processes of information technology and globalization are likely to be severe and in the article by Hutton (1997) already cited above, he says that though Australia has embraced free-market individualism and globalisation, the results are not happy, and that "loneliness is emerging as a political issue…. and male suicide rates are the highest in the world." Greider (1997), in a recent book states: "Driven by the logic of modern capitalism, the global economy, a product of the Third Industrial Revolution, is a free-wheeling system that is creating a new world order, transforming the lives and economic prospects of workers, corporations and nations"; and he concludes "that the global economy is sowing 'creative-destruction' everywhere: it allows for the accumulation of wealth on a spectacular scale, while reviving forms of human exploitation reminiscent of the late nineteenth century."

### 4.1. Giants and dwarfs

It is interesting to compare what is going on in the general area of library and information science, and information management with the picture presented at the beginning of the previous section.

Table 7 compares the Microsoft income for 1997 with that of Dataware Technologies one of the leading software houses in the area of information retrieval. After a period during which Dataware was buying other companies and showing a loss, it finally made a fourth quarter profit of just under a quarter of a

| | Income | Research funding |
|---|---|---|
| Microsoft | $ 11,358,000,000 | 390,000,000 £ |
| Dataware Technologies | $ 252,000 (4th Q) | |
| British library | | 1,467,000 £ |

*Table 7. Giants and Dwarfs*

million dollars, or assuming comparable figures for the other three quarters, a profit of .009 per cent of that made by Microsoft.

A rough comparison between the amount spent on research by Microsoft and the total amount made available by the British Library to the entire library and information community in the U.K. shows a ratio of .4 per cent.

R. D. Galliers, an eminent professor of information management in the U.K. is disturbed by figures such as these. In an article entitled ‘A manifesto for information management research’ (Galliers, 1995) he said: “At a time when there is considerable interest in the topic [of information management] and a burgeoning of academic departments and journals in the field; at a time when we are promised the “information society” —an information revolution brought about by the power of IT in much the same way that the Industrial Revolution occurred as a result, inter alia, of the invention of the steam engine, at a time when we talk of the “information superhighway” and IT-enhanced business innovation, and at a time when IT-related projects account for over half of the revenue earned by major management consultants, we still have a waning of interest and relevance of the discipline.” It is worth looking more clearly at this phenomenon.

## 5. Information management/Knowledge management

For years, librarians and information scientists have wrestled with definitions of data, information and knowledge. Recently, an “information pyramid” has started to appear in the management literature (see for example, Wiggins, 1996, p.20) (Fig. 1). Few would argue with the hierarchy but one rarely finds convincing definitions of information or knowledge. However, there are definitions of the management of these entities, often provided by the major management consultancies, e.g.

“Information management

> The effective production, storage, retrieval and dissemination of information in any form to achieve a business benefit.”

And

"Knowledge management

A framework or system designed to help companies capture, analyze, apply and reuse knowledge to make faster, smarter and better decisions and achieve competitive advantage."

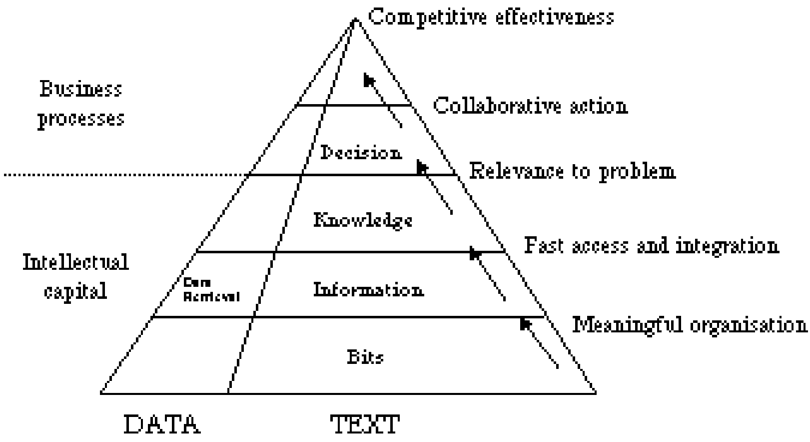


*Fig. 1. The information pyramid (Wiggins, 1996, p. 20)*

- Information Management is still not widely understood
- Although more technology has been implemented, the problems with information remain unsolved
- The focus is still on IT.
- Successful IM depends on the bringing together of human and technology resources within the framework of an Information Strategy
- Information is recognised as an important, costly and valuable resource, but the concept of managing it as such is not yet fully accepted

*Table 8. Survey of effectiveness of Information Management (Touche Ross, 1995)*

| | |
|---|---|
| A framework | static |
| Clockwork | pre-determined |
| Thermostat | self-regulating |
| Cell | self-maintaining |
| Plant | society of cells |
| Animal | brain - organised |
| Human being | speech, symbols |
| Social organisations | roles, values, communication |
| Transcendental systems | beyond knowledge |

*Table 9. General Systems Theory: the nine levels*

Note that the definitions are almost identical and that they are circular, i.e. neither information nor knowledge are themselves defined. Note also the emphasis on the 'bottom line'.

How well are organisations doing in the implementation of information management and knowledge management? Management consultants Touche Ross (1995) conducted a survey of the former, and some of their conclusions are presented in Table 8. Three years later, knowledge management does not appear to be more successful, as is shown by management consultant Chuck Lucier of Booth, Allen and Hamilton as reported by Caulkin (1997). Lucier concludes that "15 per cent of the programmes monitored by him are successes in the sense of producing real business results, while 35 per cent show no return for the effort. If anything, the meagre proportion of successes may be going down."

It is now beginning to be realised that effective knowledge management is not possible without effective information management; and that the introduction of knowledge management is not a technological trick but relies on cultural change within the organisation. That this is so has long been recognized in general terms by the better management scientist. For example, twenty years ago Checkland, in his inaugural lecture at University of Lancaster, (1969) showed how management science had evolved upwards in the hierarchy of systems proposed by General Systems Theory (see Table 9). He suggested that the "father" of management science F.W. Taylor had wrongly assumed that the work force would behave mechanistically, working harder for higher wages. This notion was found to be fallible, as was the later emphasis on feedback in management information systems. Checkland concluded that management science was properly one of the behavioural sciences and was forced to take account of human

- To save memory the year 1980 was written as 80, so that at the end of this century, many computers will calculate the 10 minutes on either side of midnight as 99 years, 11 months, 30 days, 23 hours and 50 minutes.

- Leap years:
  a year divisible by 4 is a leap year (common knowledge)
  a year divisible by 100 is NOT a leap year
  (recognized by many computer programmers)
  a year divisible by 400 IS a leap year (recognized by few programmers)

- 09/09/99 was popularly used as an expiration date in the 1980s – some files will be automatically deleted on this date

- 99 has been used as a special "exception" logic; for example 01/01/99 will indicate no date available

*Table 10. The Y2K Problem*

behaviour. In the same way, one might argue that Business Process Re-engineering has a mechanistic flavour, Total Quality Management makes strong use of the feedback loop, while Knowledge Management can only succeed by addressing the entire organisation as a social system.

## 6. Software problems

The clear fact is that if we do not, or worse are unable to think ahead and disregard the human and social element in systems design, we shall fail; and ironically that failure may be expensive.

Consider the case of the millennium bug, also known as the Y2K problem. When computer storage was at a premium, programmers dispensed with the first two digits of the year, creating huge problems that are only beginning to be addressed two years before the year 2000. Table 10 shows several ways in which the problem manifests itself. Alarming predictions are being made for disasters on 1 January 2000 including malfunctioning of air traffic control centres, road traffic control systems, credit card recognition, and bank vault doors with embedded chips. Winnett (1998) has reported that a director of a leading British bank has said he is stockpiling food and provisions and will stay indoors at the beginning of the millennium as he is convinced that there will be extensive street riots started by disaffected citizens. The potential cost of the problem is difficult to cal-

| |
|---|
| Y2K<br>$1 to change each line of programming code<br>$600 billion worldwide<br>-50% world's total IT<br>budget for 1997-99<br>Gartner |
| Y2K<br>$15.7 billion for Europe<br>Euro<br>$25.3 billion for Europe<br>- 8 months of normal IT spend by European companies; leading to a 5-10% increase in software sales above the underlying expected 15% increase<br>BZW |

*Table 11. Cost of Y2K and Euro Conversion*

culate but is bound to be huge. Some estimates are shown in Table 11 which also includes the cost in Europe of converting to the Euro. And there may be other 'timebombs' ticking away in information systems. Taylor (1998) reported that software might not be able to cope with the five-digit figure as the Dow Index nears the 10,000 mark.

Though the Y2K problem has its roots in the early days of computing, its solution is made difficult by the sheer size and complexity of today's computer controlled, or computer assisted, processes. It has been estimated (Rawlins, 1997, p.78) that whereas the complete works of Shakespeare constituted some quarter of a million lines of print, today the software for the Hubble space telescope would occupy about two million lines of code and a major telephone exchange, four million; and that it is virtually impossible to fully test such systems. Rawlins (1997) goes on to argue that hardware, which is doubling in complexity every eighteen months, has now far outstripped much of our old-fashioned algorithmic approach to programming, an approach which fails to meet either the human and social needs in the design of information systems or match the power of the hardware. Furthermore, he claims that the computer now falls somewhere between 'mechanical' and 'human' in that "we can't predict exactly what it will do next"; that "it's so complex that its behavior needs a hundred encyclopaedias to describe it"; and that "its behavior changes from hour to hour."

Kling (1996b, p.33) echoes the point about the serial approach to programming by quoting a definition put forward by the Task Force on the Core of Computer Science of the U.S. Association for Computing Machinery (ACM) (Denning, 1989): "Computer Science and Engineering is the systematic study of algorithmic processes —their theory, analysis, design, efficiency, implementation and application— that describe and transform information. The fundamental question underlying all of computing is, What can be (efficiently) automated?. (…) The roots of computing extend deeply into mathematics and engineering. Mathematics imparts analysis to the field; engineering imparts design." While not in complete agreement with Paul Goodman, Kling contrasts what he has to say about technologists with the ACM definition above (Goodman, 1970): "Whether or not it draws on new scientific research, technology is a branch of moral philosophy, not of science. It aims at prudent goods for the commonweal and to provide efficient means for those goods. (…) As a moral philosopher, a technician should be able to criticize the programs given to him to implement. As a professional in a community of learned professionals, a technologist must have a different kind of training. (…) He should know something of the social sciences, law, the fine arts, and medicine, as well as natural sciences." Whether one subscribes to the somewhat mechanistic view of the ACM or to the arguably Utopian view of Goodman it seems clear that the twin drivers of commerce and technological push are capable, perhaps even likely, to create systems which ignore the needs and aspirations of the users of those systems.

A third quotation from the chapter by Kling (Reinecke, 1984) makes this point: "Those who know most about technology are in many cases the worst equipped to appreciate its implications for the lives of ordinary people. Consumed by technical and corporate objectives that become ends in themselves, they fail to see that their work may very often be contrary to the interests of their fellow citizens. So frenetic is the pace of change that the few querulous voices raised from their own ranks are swept aside. Where the voices are more insistent, they are branded as renegades, as unstable people whose work has somehow unhinged them."

With the upsurge of interest in knowledge management and intellectual property has come the rebirth of cost-effectiveness or as it is now more commonly known 'value for money'. Attempts are now being made to value information and knowledge and to incorporate such assets into company accounts. These two sections of the paper discussing 'commercial pressures' and 'software problems' are closed with some statistics put out by the U.S. Government (admittedly, as long ago as 1979) and quoted by Wiener (1993, p.70). Fig. 2 is an analysis of a sample of software projects commissioned by the U.S. government, showing that an astounding 47 per cent was delivered but never used.

## 7. Conclusions

This paper has been unashamedly one-sided, ignoring the many successes achieved by technology and by information technology in enhancing lives and addressing social problems. The point made at the beginning of Section 2 was that “it is futile and foolish to oppose technology” but that we should recognize its “dark side”. There is an interesting Website to be found at “http://www.technorealism.org” which is attempting to promote discussion on the middle way. The manifesto states that: "Technorealism demands that we think critically about the role that tools and interfaces play in human evolution and everyday life. Integral to this perspective is our understanding that the current tide of technological transformation, while important and powerful, is actually a continuation of waves of change that have taken place throughout history. Looking, for example, at the history of the automobile, television or the telephone —not just the devices but the institutions they became— we see profound benefits as well as substantial costs. Similarly, we anticipate mixed blessings from today’s emerging technologies, and expect to forever be on guard for unexpected consequences —which must be addressed by thoughtful design and appropriate use.” Table 12

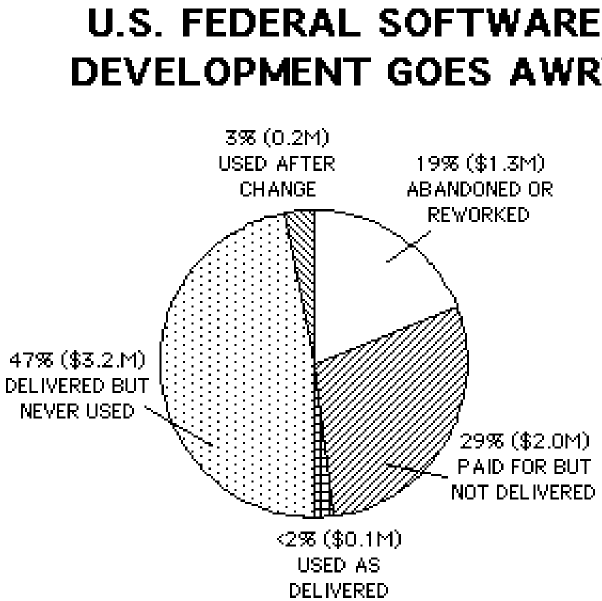


*Fig. 2. US Federal Software Development Goes Awry*

- Technologies are not neutral
- The Internet is revolutionary - but not Utopian
- Government has an important role to play on the electronic frontier
- Information is not knowledge
- Wiring the schools will not save them
- Information wants to be protected
- The public owns the airwaves; the public should benefit from their use
- Understanding technology should be an essential component of global citizenship

*Table12. Principles of technorealism*

enunciates eight principles of technorealism, of varying degrees of weight and perhaps contentiousness, but the statement that ‘Information is not knowledge’ will be readily appreciated by librarians and information scientists; and yet we face the paradox of being under threat just when we have a glimpse of a possible ‘golden age of information’. One reason for this is that, with the massive acceleration of telecommunications most clearly manifested in the Internet and in intranets, the vendors of hardware, software and information are bypassing the intermediaries and targeting the far larger and more lucrative end-user market. The job of the intermediary has always been, and remains, to understand the sources of information, the end-users and their needs, and the information channels connecting the two. This places librarianship and information science firmly in the area of the social and behavioural sciences; and however much we become involved in the channels and all the technology that that entails, we must never lose sight of the human and social aspects of our work. Systems science, the goals and values of social organisations, user behaviour and interpersonal interaction, customer satisfaction and performance measurement, language handling and knowledge representation are still some of the topics that lie at the heart of our work — our objective, to help others transform data into information and information into knowledge.

In doing so, we must understand as well as we can the pressures on information seekers and on us, and try to alleviate those pressures, particularly those of information overload and lack of time. These tasks will not be easy to achieve, but some commentators fear there is much to lose. Thus, Birkerts (1996): “In our technological obsession we may be forgetting that circuited interconnections and individualism are, at a primary level, inimical notions, warring terms. Being ‘online’ and having the subjective experience of depth, of existential coherence, are mutually exclusive situations (…) Duration is deep time, time experienced without the awareness of time passing (…) time not artificially broken, but shaped around rhythmic cycles; time bound to the integrated functioning of the senses. We have destroyed that duration. We have created invisible elsewheres that are as immediate as our actual surroundings. We have fractured the flow of time, layered it into competing simultaneities. We learn to do five things at once or pay the price. Immersed in an environment of invisible signals and operations, we find it unthinkable to walk five miles to visit a friend as it was once unthinkable to speak across that distance through a wire (…). My core fear is that we are, as a culture, as a species, becoming shallower; that we have turned from depth — from the Judaeo-Christian premise of unfathomable mystery— and are adapting ourselves to the ersatz security of a vast lateral connectedness. That we are giving up on wisdom, the struggle for which has for millennia been central to the very idea of culture, and that we are pledging instead to a faith in the web.”

This Conference has proved the value of face to face meeting and communication; the sharing of ideas and opinions, the removal of ambiguities and misunderstandings and the cementing of professional alliances.

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