PLUS ÇA CHANGE, PLUS C'EST LA MÊME CHOSE

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Rapporteur: Chrystin Emmett

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Introduction

In the various papers which I have given so far this year on aspects of electronic information I have been speaking to audiences of librarians and have been presented as an expert on whatever aspect of the topic I was due to cover on each occasion. Before this audience any pretence at expertise must fall away because computer scientists must know more about the technicalities of their subject than librarians. Instead of offering you my normal persona as an IT enthusiast, therefore, I thought it might help this audience if I attempted today to present the image of a traditionalist critic of new-fangled technology.

In case the role appears too convincing it would be as well to stress that many librarians believe that their strategic thinking on electronic information has been at least as advanced as, if not superior to much of the output from academic computing centres, certainly in the United Kingdom. I was one of a panel recently interviewing computer scientists. One of the candidates made great play of the importance of putting the "I" back into "IT" - or, in other words, the need to concentrate on the message rather than the medium. No librarian would disagree with the sentiment but, as the part author of an article with the same title published some ten years ago, the concept hardly seemed as excitingly new as it appeared to the proponent.[1] Only now, we have been told by Tom Lincoln, are traditional computing services addressing basic issues, such as the treatment of hyphenated names in filing order, which librarians have been tackling for several centuries.

As a science fiction enthusiast I start with a belief that technological solutions can be found to most problems, despite the complexity and the scale of the challenges facing computer scientists. Those more knowledgeable than I take a more jaundiced view. It has been suggested that scientists in the area of artificial intelligence almost never acknowledge their difficulties and that there is an over-sanguine approach to predicting indefinite continuance of early success. But the obstacles to progress beyond the first tentative steps may be fundamental.[2] As a manager, as opposed to an enthusiast, these are views of which a chief librarian must take account in forward planning for effective service delivery.

For librarians the challenge is not to find technological solutions to problems but to address what people do with technological answers and how they react when they apply the solution for one problem to an entirely different scenario, creating both new problems and exciting new possibilities. For those who share my enthusiasm for science fiction, a striking example of what I mean can be found in *Future glitter*.[3] In this novel Van Vogt explores the sociological impact of the abolition of privacy, leading at one moment to clear social benefits and then swinging back to more negative consequences. Responding to human interaction with machines requires expertise in dealing with humans as well as technical skill with machinery.

It is in this context, therefore, that I offer the following thoughts on the issues which computer scientists have addressed but which may need looking at additionally from a slightly different perspective over the next few years.

The IT revolution: fact or fiction?

The advent of information technology has been presented as a revolution in the communications process and several areas of development are cited frequently to justify the claim. It is true that major changes are taking place but, historically, revolutions tend to be reactionary and it can be argued that information technology is merely re-inventing old problems in new guises.

One of the most important of these is the argument that there has been increased capacity for storage. This is certainly true and, in a narrow sense, the extra capacity has been provided at less environmental cost, although I am not aware that any adequate comparison has been made between the forests lost to make paper (arguably an environmentally friendly process as it makes the plantation of forests an economic proposition) and the output of carbon dioxide and sulphur required for the production of electricity. But existing technology has coped with a doubling of journal titles every fifteen years since the mid-seventeenth century, not to mention a very rapid expansion in the size of each journal.[4] The claim is only a narrow truth and overlooks the fact that the explosion in older forms of publication may be continuing at the same rate as before. While a dip has been detected in the speed of increase of journal publication world wide it is certainly too early to determine if this dip is merely a passing hiccup due to economic factors or if it does reflect the initial impact of a revolutionary trend.[5] It is certainly worth emphasising that it is no more than a dip in the rate of increase, not a fall in the real numbers. The British Library has calculated that its receipt of legal deposit material rose by over 50% in the ten years to 1988 at a time when electronic information ought already to have been making its mark.[6] In its planning for the period to the end of the decade the British Library is estimating for a similar level of growth.

Quantity is one thing, but it is generally held that it is quality which matters and the really interesting question, which no-one has scientifically addressed yet that I am aware of, is how does the quality of electronic information compare with that of paper-based information? I shall attempt to look at the issue in an un-scientific way shortly.

A second argument has been that information technology has increased ease of access. This can be held to be true in a limited geographic sense. It can at last be held that the wandering scholar of the middle ages can been repatriated or that the mountain has indeed come to Mahomet. But in reality the facts circumscribe the case. If the barriers of distance are reduced, they are replaced by new barriers of technology. Only if the correct equipment is in place, the potential user has mastered the complexity of the systems required, the necessary passwords have been obtained and the information is there in the first place can access be gained to the increasing flow of data on the Internet. Even for the

academic population, far less the world at large, it might be held that, at the moment this is a potential, rather than an actual truth.

Perhaps the argument which is treated with most derision by non-enthusiasts is that which states that the use of information technology leads to reduced cost. Of course, a case can be made for the proposition. It is true, for example, that the costs of mounting information in electronic format are converging with those of paper production but the balancing of equations depends very much upon which factors are loaded on each side and it might be not totally unfair to suggest that enthusiastic proponents of information technology rather tend to overlook some at least of the costs of the infrastructure and equipment in their analysis.

This might not matter so much if the quality of what was available lived up to the hype with which it is presented - not, to be fair, by academic computer scientists or even all their colleagues in computer services but certainly by computer salesmen. It is not always easy for the layman to distinguish between the pitches of "experts" from different sectors of the community when broadly the same language is being used. All too often users of technology find that the reality does not match the claims. For example, an investigation which we have been undertaking in the library at Newcastle University recently reveals that optical scanners which are advertised as having a high accuracy reading rate cannot cope with German black letter script or soiled or creased pages of nineteenth century journals.

We are additionally told by some that the new technology will permit new ways of communication which could radically transform the academic world. It certainly is true that electronic-mail is enormously exciting and the prospects arising from work in graphics and hypermedia are equally encouraging but there is an enormous gap between theory and practice. Demonstrations which themselves take hours to prepare but which claim to show that a one hour lecture can be thrown together in fifteen minutes using the wealth of information now on the network cause enormous frustration when the reality is that it takes weeks to get the equipment to work for the particular piece of information wanted, only to discover that the quality of the information is inadequate for one's needs anyway and that, even when it is adequate, getting it into a form when you can use it requires the expenditure of vast quantities of additional time and effort. While these comments are expressed with a bitterness arising from recent personal experience in attempting to prepare some graphics using networked maps, I am confident that they reflect a wider truth. I heard recently, for example, from a University teacher of information technology that it takes at least one hundred and fifty hours to prepare a good one hour long computer based learning package.

Unsolved problems

Indeed it can be argued that many of the central problems of information transfer remain to be solved without too many indicators of where solutions may lie.

Although much work has been done over a number of disciplines in order to ascertain what constitutes useful information we still have a very imperfect understanding of the concept, partly, at least, because it is so general and far-reaching. There are differences between the Sciences and the Arts and between facts and concepts in what is useful and it may be impossible to predict with any accuracy in advance what really is useful. While I was doing research on the Adam family of eighteenth century architects I discovered in one collection of manuscripts, on the back of an envelope which contained a letter about something entirely unrelated to my field of research, a scribbled note authorising payment of drink money to masons which enabled me exactly to date a house which had previously been undated. The text of the letter, so far as I recall it, was unlikely to be of interest to anyone at all but the scribbled note only had value in the context of the recipient and the date of the letter. In the same collection can be found volumes of letters gathered together by someone who was interested in autographs and vandalised by someone else who collected postmarks. It is not immediately clear how information technology is coping with such diversity of useful information any more successfully than traditional methods because some human identification of what is interesting is required in advance of the sorting of the information.

It is also far from clear how useful information, however defined, is best transferred. Different media can have different effects, depending upon the purpose of the enquirer. I recall, for example, the distinguished professor in Glasgow, an enthusiast for information technology and a regular user of the online database search service, who came into the library one day announcing that he intended to do a *real* literature search. Closer investigation revealed that his aim was to use the hard copy of Chemical Abstracts because what he really wanted were the peripherally relevant articles he discovered while browsing through the volumes, rather than the centrally relevant which tended to be thrown up (with luck) when an online search was done.

The joker (or lunatic) who suggested arranging information on the Internet by Library of Congress classification may have succeeded only in uniting the rest of the world against him but there is no answer yet to the questions of what is the best way of arranging information or even of is there a best way?

Libraries, for all their inadequacies have developed as places where there are very special relationships between readers and the books, transcending the limitations of both. Moving information away from its traditional environment may have unexpected and undesirable consequences quite apart from depriving students of the mating opportunities with which I have traditionally tempted them to use the library on their first arrival at university. In similar light-hearted vein, but with a more serious underlying message, some years ago a librarian pointed out the negative impact that the development of photocopying had had on the opportunity scholars took to make initial contact with scholars in the same field through requests for offprints.[7]

Making things worse

Some of the problems which have taxed those working in the field of information for centuries have been made worse by the arrival of information technology. As early as 1613 an English scholar was complaining about the overflow of information being published [8] and from the perspective of the sheer quantity of information it is obvious that the problem has got worse with time. Information Technology, far from providing a solution has led to an exponential increase in difficulty. It is now technically possible to store far more information in electronic format than has been possible in other media and academics, in particular, seem hell bent on filling up every nook and cranny on every available disc. At a more popular level, I have heard Len Deighton being interviewed on the radio, for example, on the benefits of IT in producing blockbusters. While we may variously enjoy and welcome more Deighton novels there is less pleasure in the increasing amount of junk literature which clogs our daily lives.

With the ever increasing output of potentially relevant publication the need for sophistication in searching is pressing as never before. Five hundred years of printing have resulted in a high degree of standardisation in paper publication and a relatively sophisticated approach to tackling the standardisation problems which remain. We may still need to know foreign languages to read certain texts but even there it could be said that English is now the standard for academic interchange. Where standardisation has left room for diversity - such as in typeface - the human mind seems perfectly capable of dealing with the variations in use. Perhaps the greatest problem is the storage of books of different sizes but even here mechanisms have been developed which can be confusing to those who are ignorant but which hardly require any degree of expertise to master.

Developments such as Windows and Internet protocols have led to major improvements in a very short time in Information Technology but there is still a long way to go and it is possible that computer scientists, who themselves have the expertise to navigate through the confused sea of instructions, have difficulty in appreciating the seriousness of the problem for others. Publishers, for example, continue to stick to their own formats for electronic publications on the networks or on CD-ROM; new systems come up with new formats; and major advances often do not build upon past practice but require a costly re-skilling process.

For millennia there has been a great difference between the information rich and poor. The Temple priests in the Old Testament jealously guarded the scrolls which gave them a knowledge not available to others. In more recent times, the advent of public libraries was specifically intended to bring knowledge to the people and while there remains an enormous difference between theory and practice, mechanisms have been developed to make possible a measure of equalisation. Information Technology has not yet provided an equivalent of inter-library loan or public libraries for those without the resource to pay for electronic information. This reduces the opportunity for those with financial, technical or skills-related problems to contribute to, or learn from developments. Despite major

difficulties Romania's mathematicians have traditionally been world leaders in their field. How much longer can they keep up their contribution without access to the network? At a conference in Budapest in Easter 1993, a speaker from the National Library of Romania, Alexander Zugavru, commented "if there is a hole instead of a node on the network, the whole system suffers."[9]

It is naturally a matter of concern to librarians, whose career is dependent upon physically discrete units, when enthusiasts for information technology expound upon the theoretical possibilities which progress in their area might permit. The argument always seems to be the same: give us some (or more usually, lots) more money and we shall make old-fashioned libraries redundant - delivering the information which people require directly to their desk. The trouble is that, given lots more money, librarians or at least publishers and booksellers could do the same. Libraries have always existed as inadequate compromises between the desire to have information at the finger tips and the cost of providing it. While computer scientists make much of the potential for reducing the production and storage costs of information, they minimise the often greater costs of constant re-investment in technology which rapidly becomes obsolete.

Although publishers are currently running scared at some of the implications of information technology we have worrying indicators from the likes of Robert Maxwell and Rupert Murdoch that publishers can relish control of information access and that information technology allows them not only the means to more strictly control access but also, by doing so, to increase costs, at least for information which has value. Even when there is no direct intention to control information, the centralised approach, which is an essential component of reduced cost, can also limit ways of thinking. The dependence, in the United States, on Library of Congress catalogue cards, for example, has been cited as one reason for the continued domination of male white Anglo-Saxon attitudes in the presentation of knowledge.

For the past five and a half centuries it has been possible for scholars clearly to interpret the development of ideas in our written culture. Amendments to manuscripts, new editions of books and the flow of articles and letters in learned journals have all allowed those with concerns in that area to trace the growth of particular concepts.[10] This is important not just for historical research but in order to gain a deeper understanding of the genesis of an idea so that it may more correctly be evaluated. The advent of the word processor and the network has meant that ideas no longer have permanence. The matter was brought home to me forcefully some years ago when I was negotiating with the playwright Alan Plater, a Newcastle lad, for the deposit of his manuscripts in Hull University Library. He was happy to agree but pointed out that all he had were the final versions of typescripts as he had run them off from his word processor to his printer.

In a more general context, the impact of information technology on permanence is worrying. Egyptian papyri have lasted for millennia, manuscripts and printed books for centuries but the lifetime of much of the data stored electronically is estimated in decades.

Will society manage to find the costs of constant transfer of data before it is endangered by decay?

The way ahead

At the same time, information technology does hold out the possibility of dramatic change in the ways in which information is handled. If detailed solutions are not always in sight at least exciting developments can be glimpsed. The use of the concept of frequently asked questions to analyse the structure of software and introduce improvements is but one minor example of the way in which enhancements are being introduced and the prospect of the traditional linear patterns of thought development, dictated by the printed page, being enhanced by alternatives made possible by the flexibility of information technology seem to me to be wonderfully exciting. In the area of my own hobby, architectural history, I can see enormous benefits from the modelling abilities which IT already permits in comparing plans with facades and relating buildings to their environments. The ability with which people across the world can link up via networking can bring enormous benefit if political and economic control does not reverse the advantage.

Self-paced learning seems to offer a better way forward than the traditional teacher/class approach to teaching or the more old-fashioned audio-visual self-learning packages because information technology increases the opportunities for interactivity while hypertext and its associated developments do allow the opportunity to hone in on brief, but important references in otherwise irrelevant texts.

If even the sceptics can concede a potential for good in information technology there still remains a further doubt. Are computer scientists safe to be trusted with such developments or is it more probable that they will make a mess of things, either by obsession with technology or by a tendency to re-invent the past? There may be those who, on the basis of observation, might argue that too many computer scientists are concerned with theory rather than practice. This weakness was highlighted for me earlier this year in Poland when a computer scientist who was responsible for writing a programme responded to an attack on his delay in finishing the job by stating that he had mentally solved the problem but was now too busy thinking about other problems to get round to finishing the writing of the program. We can all trade insults and it is not for me to say if such a weakness is universal, merely widespread or only a rare occurrence but computer scientists do need to address the question of how far their education and training fails to prepare them for practical achievement, as opposed to problem solving. In similar vein those concerned with directing the future of education in computing science may wish to ask if an obsession with technology is in danger of obscuring the human interface and if narrow concentration may carry the threat of constant re-invention of other peoples' wheels.

Whether by working with experts in other fields or merely by using the results of their researches, I would argue that computer scientists need to be aware of a humanistic as

well as a mechanistic angle on some of the main issues confronting the further progress of information technology.

First amongst these I would identify quality control of the information that is passed across the network. While eternal vigilance is the price not only of democracy but of avoiding the censorship which, in some ways, can be more easily exercised over electronic information, we need to continue the examination of how technology can be used to monitor, assess and identify quality. In addition, there must be ways in which information technologists can develop and facilitate the new ways of thinking and communicating to which I made reference earlier.

One of the prime examples of bad library practice ending with beneficial results is the inadequacy of most classification. The disassociated connectivity of books theoretically misplaced in the classification sequence can lead, through serendipity, to a coming together of thought patterns which help in making the great breakthroughs. Progress in transferring such chance connections in information technology are being made but it seems that this is a fruitful field where a proper analysis of the thinking processes involved could lead to a much greater facility to make these fruitful, apparently inconsequential linkages.

If mistakes can be profitable, the harsh reality is that most untrained online information searchers are facile and unsophisticated in the use they make of information technology - just as they are in the use they make of libraries. Yet studies have shown that there is a higher satisfaction rate amongst those involved in direct online user searching than in those who take advantage of a mediator. It is not clear why this should be so, even if there are some obvious potential reasons, and more work needs to be done on the critical interface between information and imagination in order to design systems which allow the end user to make best use of the sophistication available.

Whatever changes take place, every effort should be made to make change progressive, rather than random in the impact it has on the user interface. Great strides have already taken place in this area but more work needs to be done to ensure that the ordinary user, as opposed to the IT enthusiast spends the minimum amount of time learning new techniques with each generational change of machine or system and the maximum amount of time benefiting from the improved capacity of that machine or system.

Conclusion

I am conscious that many of the points I have made will have little direct relevant to the immediate research work of computer scientists. I make no apology for that. There are sufficient numbers of computer scientists making exaggerated claims about their powers to change the world, to require a critical examination of the validity of such claims in the light of what is being achieved. It is indeed possible to argue that computer scientists hold the key to the future, but they will not make progress unless they find the right lock which has been correctly installed and sufficiently maintained in order to let them properly use

the key. If computer scientists are the key holders, they need to work closely with the lock smiths, the joiners, the oilers and all the other experts in the information world in order to make satisfactory progress. In common with activity in many other disciplines this might suggest not that computer scientists extend their discipline to cover every conceivable subject of relevance but that they participate in joint research teams using the skills of other experts and that they at least attempt to take account of these other skills in giving students a wider perspective of the world in which they operate. For those who prefer to go it alone I would finish with a word of warning from a seventeenth century commentator on the religious disputes of that time. Arguing against those who wished to practice independency in rituals of religious observance Sir George Mackenzie wrote:

"I am of opinion, that such as think they have a Church within their own breasts, should likewise believe their heads are steeples, and so should provide them with bells .."[11]

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DISCUSSION

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Professor Hartley considered that the reason for encouraging people to write more was that they received promotion on the basis of their publications. People writing on the network did not cause problems for librarians. Mrs Foster pointed out that peer-review of networked journals was now common.

Professor Lincoln referred to his earlier talk and said that Melvyl allowed serendipitous searching. Mr. Mowat agreed that it was a good system and both speakers supported the idea that surprise discovery was important. Professor Lincoln recalled that he had found readable mathematics books in the library by looking for the ones with dirty covers; it should be possible to look for the same thing electronically, perhaps by using a citation index. Mr. Mowat considered that citation analysis was a difficult issue. There was a danger that valuable sources might be eliminated purely on the basis of counting the number of people accessing that source.

Professor van Rijsbergen, referring to his earlier talk, explained that there had been insufficient time to explore his ideas of the user being part of the system. He gave as an example a search for news items about Chernobyl, which showed that successive iterations of "like" could give information by association and thus lead to serendipitous discovery. There was some discussion between Professor Coulouris, Professor van Rijsbergen and Professor Hartley about whether the association was syntactic or semantic.

Professor van Rijsbergen commented that consistency between human indexers was very low, and that automatic indexing out-performed human indexing. Mr. Mowat said that inconsistency between human indexers was not necessarily a bad thing, and that usefulness must be considered versus relevance. Indexing was easier in the sciences than in the arts. Professor Lincoln pointed out that Melvyl consulted indexes all over the university. This had the benefit of several different perspectives on the same book.