READINGS ON TECHNOLOGY AND CHANGE

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Published by the Community Research Action Centre (CRAC), Union Building, Monash University, Wellington Road, Clayton, Victoria, 3168. (03) 541 3141/3125
1986

Technology and the Future of Work

Albert Langer

Attitudes towards technology and the future of work reflect a fundamental division in world outlook generally.

People with a progressive world outlook compare the present with the future and find it wanting. They are excited by the possibilities of the future and optimistic about achieving those possibilities. Correspondingly they are discontented with the present and welcome its disintegration. Above all, progressives advocate the abolition of the wages system, and the system of property ownership on which it rests, as the principal barrier to the unfolding of human potential.

Progressives are divided between reformists, who believe the present can gradually be transformed into the future, through step by step cumulative small changes, and revolutionaries, who believe a radical and violent rupture of the old is both inevitable and desirable in order to bring birth to the new.

Another division among progressives is between scientific socialists and utopians. Utopians do not contrast the present with the future but look at the future by itself in isolation from the present, putting forward various schemes and fantasies about how the future 'should' be organized. Scientific socialists draw their perspective on the future and how to get there, from an analysis of trends in the real world of the present. They look for forces within modern society that are its inevitable product and that at the same contradict modern society and tend towards its disintegration and destruction. They look therefore towards the class of employees, who are the essential product of modern industry, now constituting the overwhelming majority of the population in every advanced industrial society, as the social force that will destroy that society in order to abolish its own conditions of existence.

People with a fatalistic world outlook have no sense of history and are incapable of contrasting the present with either the past or the future. For them the present can only be compared with itself. It may be good or bad but above all, it is inevitable. Things have always been more or less the way they are, and they always will be. Such is fate. At best things move in cycles. This world outlook was largely smashed in the Western world centuries ago by the indisputable facts of rapid social change. You could be for the changes that were happening or against them, but it became impossible to deny that 'the times, they are a changing'. Fatalism remains important in the East and also has a curious reflection in the growth of Eastern mysticism in the West. The immense ideological confusion accompanying the rapid disintegration of modern Western society has put all traditional Western world outlooks into question and given some temporary credibility to even the most absurd alternatives.

People with a reactionary world outlook compare the present with the past and find it wanting. Things are going from bad to worse and something must be done to stop the rot. Reactionaries are perpetually looking backwards towards some mythical golden age in the past, when social contradictions were not so acute and the

present organization of society was not so obsolete. Reactionaries correctly recognize that developments in modern technology are continually undermining existing social relationships. Accordingly, they seek to control and restrict the development of new technology so as to preserve the old social relationships. Reactionaries are afraid of new technology precisely because of its impact on the future of work.

Central to the world outlook of all modern reactionaries is defending the old organization of work – wage labor. Old fashioned reactionaries defended feudal subservience or even slavery with catch cries upholding the dignity of serf and slave labor and denouncing the modern bourgeois mode of production for radically disrupting the natural ties that bound the exploited to their exploiters. Modern reactionaries still hanker nostalgically for some sort of return to pre-industrial society, with smaller communities and a rejection of the cash or market economy. But their main efforts are devoted to preserving wage labor, which they see as the only possible or acceptable organization of society. Their central slogan is "The right to work". By this they mean the right of the vast majority to be employed for wages, that is to have their life time bought for cash, to be employed, used or exploited, (they are all synonyms) by those who own and control the means of production.

In defence of wage labor, reactionaries will go to any lengths. They even explicitly support labor intensive methods of production in opposition to labor saving innovations, precisely on the grounds that labor intensive techniques create employment while labor saving innovations undermine it. In other words, reactionaries believe we should all work longer hours, to produce less output, simply in order to preserve a system of social relationships based around the employment of wage labor.

In opposing labor saving innovations as such, reactionaries find themselves opposed to all human progress. The very name 'reactionary' is taken from their attitude of 'reacting' against new developments. They have a continuous grudge against fate and their most characteristic mode of expression is the 'whinge'. Instead of looking forward optimistically to the tremendous possibilities of the future, they are always whinging about the present, which they imply is heading down some dangerous path away from the tried and tested benefits of the past.

The clearest and most consistent expression of the reactionary world outlook, will be found in most of what passes for the 'left' in advanced Western countries. Instead of looking to the future and presenting a positive program for transforming social relationships to correspond to the possibilities now open through modern technology, these 'leftists' are exclusively concerned with contrasting the present with the past. Like all reactionaries, they find the present wanting and they whinge about it. Their language and their whole outlook is indistinguishable from that of certain old people, defeated and crushed by life's struggles, who are forever moaning "what's the world coming to" and "things aren't what they used to be" and "I don't know where it will all end".

When one listens to the whinging of old reactionaries it is possible to classify almost every sentence of social comment they utter into one of those three categories. Naturally people find this all rather boring and tend to leave such reactionaries alone to moan and whine to each other. The reactionaries put this down to the arrogance of youth and their disrespect for their elders and betters. They add complaints about the ignorance, apathy and stupidity of the young, to their litany of woes.

It is very instructive to pick up any issue of any allegedly 'left' publication and classify each sentence for its essential content. Most are saying "What's the world coming to", "things aren't what they used to be" or "I don't know where it will all end".

We need not be surprised that their publishers are being left alone to moan and whinge to each other, nor that they tend to agree among themselves that people are generally ignorant, apathetic and stupid. Why else would the vast majority of the population who prefer the mass media to these publications be ignoring the important truths that their elders and betters are so patiently revealing to them, if they are not ignorant, apathetic and stupid?

Reactionaries are essentially irrelevant in any society undergoing rapid social change. That is why they have to seek inspiration from outside their own societies by holding up as positive some stultifyingly boring reactionary regime abroad. It took a great deal for 'left' reactionaries to abandon their wild enthusiasm at the advent to power of the medievalist Khomeini regime in Iran. While most 'leftists' are at least embarrassed about the police states of eastern Europe, the only voices claiming such regimes are not intolerable, will be found on the 'left'.

What the new technology promises for the future of work is quite simply its abolition. The industrial revolution drastically reduced the requirement for direct manual labor in producing most goods. Craft labor was replaced by the supervision of work actually carried out by machines. The new industrial revolution is simply carrying forward this same process, replacing human supervision of machines with electronic supervision of machines. Perhaps current developments in molecular biology and genetic engineering will involve some fundamentally new evolutionary process in which the human species itself is changed radically and quickly. That would be very exciting and therefore naturally arouses the deepest fears of reactionaries. But the new technology that is having the greatest impact at present – microelectronics and so forth, is only accelerating the same kind of new forms of human society, and a higher development of humanity, that has been a fact of life since the end of the dark ages.

The future role of humans in production will be primarily mental labor – the creative planning, management and direction which requires human intelligence rather than just human eye and hand coordination. Science itself is emerging as the most powerful productive force and the the struggle for production is merging with scientific and technical research and development. Modern industry can only be planned, managed and directed by workers with a far higher cultural level than before. The educational level and degree of initiative and responsibility required are quite incompatible with the social status of an employee, a wage slave who "only works here".

The consequences of the industrial revolution were first comprehended theoretically by scientific socialism in the nineteenth century. The old socialist movement that merely denounced capitalism gave way to a new communist movement that understood its inner working and the tendencies within capitalism that inevitably drive towards its abolition. Marxism explained how the very process of capital accumulation implies continous technological progress and a continuous socialization of production and centralization of ownership. It explained how this process creates a class with no stake in the old society and both the capacity and the necessity to overthrow it.

A century has passed and a new industrial revolution should involve fundamentally new theoretical problems and a further major advance in our understanding of social development. It is ironic that Marxism has been virtually extinguished in the West, during precisely the period of its most vivid confirmation. The fact that piecemeal reform of capitalism cannot lead to its abolition stares us in the face. All the social reforms and all the technical progress of the last century have landed us in an impasse where once again the world is sliding towards a gigantic economic crisis and a third world war. It is glaringly

obvious that the social relations of capitalism are no longer a factor promoting progress but a barrier preventing us achieving the kind of life that is already technically possible.

Not only does the large majority of humanity in third world countries eke out a miserable existence with starvation and semi-starvation still the norm in many areas, but even in the most advanced countries an ever growing part of the labor force finds itself shut out completely from all benefits of social and technical progress. The dominance of reformism in progressive movements is coming to an end because capitalism simply isn't delivering the reforms required. The immediate effect is a collapse of reformist movements and reformist ideologies. People who used to feel comfortable fighting for all kinds of social progress within capitalism, whether they acknowledged these struggles as reformist, or pretended they were revolutionary, now feel bewildered and lost. They either accept incorporation in the consensus politics of the reformist state, dropping all pretense of oppositional politics, or they drop out of political activity, rethinking their whole position. Most progressive organizations are currently disintegrating in a miserable fit of the blues as their activists recognize the bankruptcy, futility and sheer worthlessness of the activities that previously sustained their interest.

This disintegration of reformism appears very depressing if one pins ones hopes for the future on reforms. Indeed it is depressing that there is still no revolutionary oppositional current emerging to fill the vacuum being left by the virtual collapse of reformism. But the coming crisis will pose the question of revolution more sharply than it has ever been posed before.

The fact that most of the 'left' have abandoned progressive reformism in favour of frankly and openly reactionary attitudes towards technical progress can only accelerate a deeper understanding of the necessity for revolutionary politics. The more that reactionary 'leftists' prattle on against modern technology the less interest there will be in their views. Some workers will put some energy into 'defending the right to work' and even resisting innovations that reduce the amount of work required. Some with particular skills that are becoming obsolete even have a direct material interest in resisting new technologies that undermine their position, just as their employers will continue demanding ever increasing 'protection' from competition. But the more energy they put into reactionary resistance, the quicker they will realise the futility of this kind of struggle.

There will always be conservative workers who will 'militantly' struggle to defend obsolete traditional ways of doing things. They will sometimes succeed in preventing a particular innovation in a particular industry. Demands to control and restrict the new technology will get some support, especially when dressed up as an assertion of the workers right to determine their own destiny instead of having things foisted on them for the benefit of management. But in the long run these campaigns cannot succeed. The dead end is obvious.

Even the most conservative workers cannot actually feel inspired by a program to preserve things as they are, because everyone knows that things aren't all that wonderful and they are bound to change anyway. At best they can go along with such campaigns out of a feeling of desperation and having no alternative. It may sound very militant to demand that the bosses justify every innovation before it is introduced, but what really needs justifying is why innovations are *not* being introduced. Unlike 'left' trade union officials, most workers do not see their bosses as dangerous radicals hell bent on untried experiments. They see them as stodgy conservatives who are a real obstacle to actually getting anything done. Workers will demand control of technology, not in the sense of restricting and slowing down labor saving innovations, but in the sense of taking control of their work and

abolishing it as rapidly as possible.

When a revolutionary left emerges it will not abandon the fight for reforms and it will not ignore the issues posed by new technology. But instead of demands that any changes to existing work methods be justified, it will demand that any continuation of obsolete work methods be justified, and it will do so in the context of a positive program for re-organizing the whole of society. Instead of 'reacting' to this or that initiative by by bosses, a revolutionary left will take the initiative showing how society can and will be radically transformed when it wins power. Its central activity will not be 'demanding' that the bosses refrain from doing this or that, or even demanding that they positively do this or that, but simply pushing the bosses aside and doing things our own way.

A sad sign of the collapse of Marxism is the frequent polemics which reactionaries launch against the idea that technological change is neutral and can either benefit workers or capitalists depending on how it is implemented. Even sadder are the replies from alleged Marxists, pitifully proclaiming that not all technological change benefits the ruling class and that it would be possible for workers to benefit from new technology if only they had control of it.

Whether one accepts or rejects the Marxist position, it has never been that technology is neutral. At the very center of Marxism has always been the concept that technological change, development of the forces of production, is the active positive dynamic element that pushes social development forward, compelling the social relationships to adapt to changes in the underlying economic reality, or else burst apart attempting to constrain those changes. Presumably reactionaries would be even more hostile to the idea that technological change is the positive motor of social development than to the idea that it might be neutral. The fact that they see no need to denounce such views indicates that they have never even heard of them. Marxism has been buried for a long time now. When the positive rather than neutral attitude towards new technology becomes recognized as the main target for reactionary polemics, we will know that the revival of Marxism has really begun.

Slaves who 'militantly' demand that their owners stick to tradition deserve to remain slaves. Progressive workers make no such demands of their employers. The revolution will come when a party emerges that makes no demands of the employers at all, but simply overthrows them in order to carry out its own positive program for unleashing the productive forces of humanity and reaching towards the stars.

Deskilling Debunked

David McMullen

The technological changes that have accompanied industrial development during the last one hundred years or more have led to the elimination of a whole range of old work skills. It is often argued that this process has meant the polarization of the work force into a shrinking minority of highly trained workers on the one hand and an expanding majority who are confined to increasingly unskilled, tedious and repetitive tasks on the other. This approach owes much to the work of Braverman and it is very much the prevailing orthodoxy of the left. This article aims to refute this 'deskilling' thesis.

Shop Floor Approach

The deskilling theorists conjure up the picture of a typical shopfloor producing a particular product or range of products. Originally work was performed by skilled craftpeople. These were replaced by machine operators. And with automation, the machine operator is replaced by unskilled machine minders or process workers. A similar picture of deskilling is painted for clerical work and retailing. This approach has a number of weaknesses.

You could be excused for thinking that in days gone by every blue collar worker was a craftperson or skilled machinist. No mention is made of the navvies who built the roads and laid the railway tracks, the coal miners with their pick and shovel, the army of illiterate domestic servants or the factory fodder ground down by toil in the 'satanic mills' of the nineteenth century.

It may well be that a particular technological change in a factory leads to a skill dilution at the point where it is introduced – the elimination of skilled machinists being a typical example – but nevertheless the skill level in the sequence of production as a whole may still be raised. Also, there have been massive shifts of workers into totally new industries, so that what may have happened in older industries is far from the whole story. Over the period, jobs in agriculture have shrunk significantly, those in the service sector have expanded dramatically while those in manufacturing expanded until the 1960s and are now contracting. Furthermore, the jobs eliminated by technological change are by no means confined to skilled ones. The word processor has meant the end of a lot of routine typing work through its ability to generate standard letters. The new generation of computers are eliminating the menial task of key punch operator. Input entry is now being performed by a whole range of more skilled staff via their desk top terminals. The containerization of ship cargoes has significantly reduced the number of wharf labourers. Road-making and excavation machinery has meant the end of a lot of pick and shovel work. And most important of all, robots are currently abolishing most assembly line work.

When looking at recent or current technological changes, the deskilling theorists assume that the knowledge incorporated in the new machines (or software) is typically the knowledge of the worker. It thus appears obvious that the change involves deskilling. However, it is only in a very early stage of industrial development that this can be considered the general form of the process of technological change. Capitalist industry has long since generated an internal division of labour in which it is no longer primarily the knowledge of blue collar workers that governs the process but rather

that of technicians and engineers.

Education and General Ability

Comparing skill levels is complicated by the fact that job skills of the past were specific to a particular task whereas now they are more likely to take the form of general abilities based on a higher level of education. These modern 'skills' are those necessary for job mobility and for coping with changing production processes.

Deskilling theorists dismiss the increasing level of schooling as 'teen-minding' – a form of disguised unemployment that has nothing to do with work requirements. They even employ the hoary old right-wing argument about how standards are slipping and that what is taught during this extended period of schooling used to be taught in much less time. (Braverman, p.439) Maybe now that secondary education is no longer confined to the 'educated classes' the average standard has temporarily declined. But so what? The fact remains that the average level of education of the population as a whole has been raised.

There is a tendency to take for granted the abilities acquired by a general education. For instance, an average nineteenth century worker would have considerable difficulty in filling a modern low-skilled clerical or retailing job. These jobs may not be overdemanding, however, they cannot be performed by someone who is illiterate and dead ignorant. A general education level also means people can pick up tasks with far less training. Braverman in derogatory fashion refers to the fact that it only takes six months to a year to train a computer programmer. (Braverman, p.444) Sure, but try turning it into an apprenticeship for uneducated 15-year olds, the traditional method of training workers. It would very quickly become a five-year course!

Even aside from general schooling, technical training has expanded considerably. Thirty one per cent of the Australian labour force has trade, technical and other certificate qualifications and 9.5% have degrees. This is a workforce that is supposed to have been subjected to over a century of deskilling!

Braverman suggests that growing signs of dissatisfaction with work are indicative of the fact that work is becoming increasingly routine and lacking in skill. However, his argument is somewhat weakened by his admission that the dissatisfaction is greatest among the better educated. (Braverman, pp.34-5 and p.441) This would seem to suggest that the increased dissatisfaction is due to people's expectations being greater. We have here one of capitalism's many contradictions. Modern industry requires a worker with a higher level of education and general level of ability. However, capitalism thereby creates someone who is less likely to be reconciled to the hierarchy and tedium that the system still imposes on the labour process.

Division of Labour

As we have noted, according to the accepted wisdom, technological change is leading to an increasingly rigid division between a skilled minority who know what is going on and a majority who simply carry out repetitive and mindless tasks. In actual fact, the changes taking place are doing the opposite, and the elimination of the old skills is an important part of the process. Let us start by looking at the effect of the 'microprocessor revolution' in the office. Firstly, as mentioned above, the word processor is eliminating a lot of the more routine typing tasks. Secondly, there are signs that 'word originators' will be doing an increasing share of their own typing, given that virtually everyone will have a terminal on their desk. Once voice recognition comes on the scene the need for typists will be greatly reduced if not completely eliminated. Furthermore, senior staff will also find themselves doing the work of file clerks, as they search for information on their desk top terminal. A similar breakdown of the division of labour can be found in the newspaper industry. The journalist is

increasingly taking on the job of the typesetter. Instead of using a typewriter the journalist types the story directly onto a computer that formats it for printing. In terms of the deskilling debate you could say that the task of file clerk and typist is upgraded by being merged with 'managerial' work and that the task of typesetter is upgraded by being merged with that of journalist. (Of course, there is no suggestion that the person filling the original position is necessarily upgraded as tasks change. For instance, many typesetters are simply being thrown on the early retirement scrap heap.)

In manufacturing, automatic drafting equipment (ADE), computer aided design (CAD) and computer aided manufacturing (CAM) are eliminating our reliance on a 'technocratic elite' with years of specialized training and experience. Instead these processes will be accessible to anyone who is 'computer literate' – and within a generation that will mean most people.

There is no denying of course the fact that capitalism has a tendency to thwart this erosion of the division of labour and to make work tedious and limited for as many people as possible. Adler cites various situations where lack of 'staff development' has meant that the potential of new technologies is scarcely tapped. In some cases word processors are used simply as fancy typewriters, flexible manufacturing systems (FMSs) are used like very inflexible conventional automated assembly lines (Adler, p.18) and computer aided design systems (CAD) are used as if they are nothing more than electronic pencils (ibid, p.16).

Conclusion

To conclude, the retention, rather than the elimination, of the old skills is the source of hierarchy in production. The time spent learning and applying such skills is time *not* spent learning and applying a broad range of abilities. And it is only when the average worker has this broad range of abilities that we will be able to dispense with bosses and managers. We want a society where everybody is engaged in the decision making, research and development side of production. Let's leave the manual work to the robots and menial mental tasks to the computers.

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Personal Computers and the Disabled

Albert Langer

National videotext networks are now available in most developed countries that can establish two-way communications with any person equipped with a telephone and a modified TV set costing only an extra $20 to manufacture. They are hardly used at all because they do not provide the access to current news, books and periodicals that is already possible with existing technology. Instead they just provide financial data and other information useful to business circles.

The current level of communication charges for such services are already within the reach of disabled people. These charges are entirely to cover the total cost of establishing the system and involve very little extra cost for handling additional volumes of use. So once videotext becomes widely used the charges will become insignificant. There is no reason why right now, substantial discounts could not be provided for low income earners and disabled people.

The refusal to do this, for ordinary telephones as well as videotext, reflects sheer bloody mindedness rather than any economic compulsion. This perverse desire to oppress disabled and poor people even though more total revenue could be obtained from wider use, will certainly be overcome once disabled people get their act together and mount a vigorous campaign, using the communications provided by the videotext network itself, to let everyone understand the absurdity of shutting them out.

A videotext network for the disabled will be about the first really significant use of videotext so far. This should be given absolutely top priority, simply as a means of providing effective communications among people who have difficulty travelling and communicating and therefore difficulty organizing to insist on their needs being met. But the implications go far beyond this in enabling disabled people to compete on essentially equal terms for almost any kind of office work, and to do so in co-operation with able bodied people rather than in a separate employment sector.

Even a person with no mobility at all, no sight, no hearing and control of only a single muscle group can communicate effectively using a computer. An eyelid flicker or other muscle movement is sufficient to control a single switch input device costing only a few dollars. Output is far more convenient using vision or sound, but can also be achieved more slowly using tactile pressure. A totally incapacitated person need not be a Helen Keller to achieve effective communication.

Even if muscular control is erratic, a computer can easily filter out semi-random movements to distinguish between "on" and "off". I have seen people in motorized wheel chairs careering wildly across the footpath because they cannot steadily control the joystick. This is totally unnecessary since attachments to filter out the jerking could be included for less than $10.

It is literally a crime that people with no communications are still being left to vegetate in isolation when the equipment necessary to open up communications for them is al-

ready actually cheaper than the additional costs of institutional care. Eventually institutions will realize that they are spending more money on staff salaries for people using ludicrous pointer systems for a few hours a week, to establish minimum communications, than if they got the equipment needed now.

For those who are able to use a head pointer rather than a single switch, and can point to letters or words marked on a board, there is simply no problem whatever. More sophisticated input devices are readily available, but if necessary the existing board could simply be used as a keyboard by making electrical contact between the head pointer and conducting material on each square of the board.

Sophisticated software systems have already been developed to redefine the meaning of each square on the board, according to context, so that a selection from thousands of sentences can be displayed on screen (or by voice for the blind). But even the cheapest computer system, with standard wordprocessing software for assigning and redefining words and phrases for each keystroke, would provide an immediate and dramatic improvement.

There is no need to wait for institutional inertia to dissipate. An emergency rescue operation should be mounted to save people from the deprivation of communications currently being criminally imposed on them by institutions. Even the simplest set up costing a couple of hundred dollars would allow people using headpointers to compose complex messages without any assistance and print them on paper, have them spoken by a voice unit or transmit them to other computer users on networks over the phone, as well as displaying them on an ordinary TV screen. Indeed with the opportunities open for employment using computer networks, it would pay some enterprising capitalist to fund the necessary equipment and be paid back within a very short period out of the salaries earned.

Communication with a single switch input and tactile output will always be extremely slow, and even a headpointer and TV screen will be slower than ordinary speech. But for anyone who is not totally incapacitated, the use of a computer for communications can literally place them on an entirely equal footing with an able bodied person doing any kind of office work.

There is no problem whatever for the deaf, and the problems for the blind are easily overcome. Speech output devices able to talk in a well modulated accent are available as "Speak and Spell' toys for less than $50. Software enabling blind people to use computer terminals with the same ease as sighted people is still inadequate or expensive, but there is certainly no major technical problem involved, and no technical or economic reason why blind people cannot use computer terminals in much th same way as sighted people, right now.

Short hand typists can easily reach full dictation speeds using all 10 fingers. There is no reason why anybody with a speech problem but full use of their fingers should not be able to speak normally. The only difference for people unable to use a keyboard is that they would be forced to speak more slowly, but equally clearly.

Voice control of computers is still complex and expensive. But the technology has already been developed and will soon be economically available. Naturally no priority has been given to the problems of disabled people who need voice input for daily life and work. But massive efforts have gone into speech recognition for fighter pilots to control their aircraft in high speed and high acceleration combat. There has also been considerable research into speech recognition so that spy agencies can monitor large numbers of telephone conversations with automatic selections for transcription and further analysis where topics of interest are mentioned.

This technology is already starting to be used for some office work such

as accepting sales orders by phone, and it will eventually "trickle down" to the disabled.

There are already tens of thousands of professionals in the United States who work almost entirely from home using computer terminals to communicate with their co-workers via networks. This started with computer programmers themselves but is now quite common for other kinds of workers. An important and growing area is the use of computer databases by librarians and research workers to produce literature searches and bibliographies etc. This job can only be done on line and it can be done just as well by a disabled person as by an able bodied person.

There is an extensive social life on these netowrks with bulletin boards exchanging messages between people with common interests, continuous written conferences extending across continents, an equivalent of "Citizen Band" radio and many other facilities. A large number of disabled people are involved in all this and it is simply impossible to tell what disability a person has from the other end of a computer terminal, so there is no discrimination in employment.

There is even an interesting development of "Compusex" on the networks, with people jointly constructing sexual fantasies on line, in a similar way to telephone sex, but with the uninhibiting factor of anonymity.

Increasingly office systems are themselves becoming indistinguishable from more specialised computer networks. Desktop terminals are used to store and retrieve documents for individual workers and pass them between workers. This development will greatly facilitate involvement of disabled people in office work. The technology is already extensively used by larger multinational companies and will rapidly penetrate the rest. Right now it would be possible to implement special projects for disabled office workers, whether working in offices or at home. Certainly there is no excuse for disabled people's organizations not to be using this technology. The additional costs are easily covered by the additional earning capacity.

It should be an absolute top priority to establish similar networks in Australia to those already widely used in the U.S. As a first step, some organization should take the initiative to tap in to what is happening on the U.S. networks. They will immediately find an enormous amount of information and assistance from the many special interest groups already functioning on line for people with particular disabilities.

For example a "Deaf Net" is linking people who use Telecommunications Devices for the Deaf into the standard networks. Ordinary terminals are much cheaper to buy than one years rental for the absurd terminals previously provided for deaf people to use the phone only to each other.

At present it costs about an extra $12 per hour plus 30 cents per 100 words to tap into the U.S. networks from Australia, exactly as though one was resident in the U.S. Some organization of disabled people should do it *immediately* and pass on the news of the tremendous possibilities that are open. Even these charges are mainly to cover the total costs of the satellite communications systems that are mainly used by large multi-national companies. Again there is no reason why a concession rate, or even just an off peak rate should not be established for disabled people, or for a specific project to open up the possibilities. The long term increase in total revenue would easily pay for this concession.

As far as the equipment required for people with specific disabilities is concerned, it is already available, right now, off the shelf. Every disabled person should already own a personal computer and a modem to connect to computer networks via the phone. Any organisation of disabled people that does not use computers is either ignorant or simply not serious.

There are literally hundreds of thousands of computer hobbyists in Australia, thousands of whom

regularly use bulletin board systems to exchange messages with each other for the price of a local phone call. This will greatly expand as the new videotext network catches on. As soon as disabled people start using these bulletin boards and the videotext network to leave messages explaining what is required, they will find a lot of computer hobbyists eager to help, but presently quite unaware of the situation.

Any disabled person or organisation that isn't using computers should immediately obtain a book called "Personal Computers and the Disabled" by Peter A. McWilliams (Quantum Press/Doubleday). Published in October 1984, this book was a year out of date before reaching Australia. So some organization of disabled people really ought to maintain a U.S. office to keep up-to-date with the extremely rapid developments there. The book includes 100 pages of addresses of organisations and publications relevant to computers and the disabled in the U.S. Another 50 pages gives descriptions of commercial equipment and services for use of computers by the disabled available now. (A lot of the rest of the book isn't much good, but these 150 pages make it *essential* reading). I understand the Disability Employment Action Centre will be making copies available. Phone: (03) 480 2322 (voice) or 480 4281 (TTY).

Frankly it is astounding that there isn't even a bulletin board system functioning yet. This is well within the capacity of even the smallest community organisation and there are dozens of computer hobbyist bulletin boards already operating, most of whom would be eager to help. Their addresses can be found in the Australian computer magazines on sale in all newsagencies.

Computerised Libraries

Perhaps the largest impact of computers on daily life and job opportunities for the disabled will be when all the contents of all the world's libraries are placed on line.

Radio and television receivers were once toys for the rich. They are now commonplace for even the poorest people and make a substantial difference to the lives of many people with disabilities. Computers will soon be as cheap as transistor radios and quite powerful units are already within the reach of most people in developed countries, although at present they have no particular use for them except as toys.

But computers could be of enormous use to every literate person, and especially to disabled people, if a simple step was taken by the national libraries in developed countries. That step consists of making accessible the microfilm archives which already exist of all published works. (These archives have been established in case the superpowers plunge the world into a nuclear holocaust.)

The technology already exists for a few months work, costing a few million dollars, to put every publication onto digital audio HiFi compact disks, using Optical Character Recognition devices already widely used in modern offices. Even working from individual copies of publications instead of microfilmed archives, the project would only cost a bit more and take a bit longer. Indeed most publications are already typeset using word processors and computers and no additional work would be required to make them available. Many full text databases are already on line, including all material provided to daily newspapers around the world by UPI, Reuters etc.

Once master copies have been produced, compact disks can be manufactured for less than $5 for each small disk holding more than 500 million characters or 1000 fully indexed books per disk. Domestic HiFi compact disk players are already retailing for under $200 and computers capable of retrieving this information for display on ordinary domestic TV receivers can already be manufactured for under $100. Laser printers, similar to photocopiers, but capable of printing fully typeset pages from such

information, at about 1 cent per page, are also becoming commonplace office equipment.

Placing the contents of all libraries onto videotext networks would obviously have an enormous positive impact for able bodied people. The reduced costs of publishing and distribution would pay for the initial setup many times over, quite apart from the benefits of wider access to current information.

The impact in Third World countries would be far greater. Any region that could afford a local radio broadcast station could afford a local computerised library holding every publication in the world (or a much smaller selection if desired). Every village or school that could afford a TV set could have access to that library. Every publisher, bookshop or newsagent that could afford a photocopier, could produce perfectly typeset copies of any material required, on demand, at a fraction of present costs. As the price of computers, TV sets and photocopiers continues falling rapidly, this means that soon there could be as wide access to publications as there is now to radio broadcasts.

There would be no need for generous "aid" for developing countries, educational institutions and schools to buy textbooks and establish libraries, just as no "aid" is needed to buy air. It would simply be part of the environment, now owned by anyone.

For this reason, if the developed countries do not implement such computerised libraries themselves, the Third World will eventually do it for them.

But why should disabled people have to wait for Third World "pirates" to solve their problems? Such libraries would mean that people with difficulty reading because of visual, motor, muscular or movement disabilities would immediately have exactly the same access to information as everybody else. They too would need far less "aid".

This would open up a dramatically enhanced range of employment opportunities on an entirely equal footing with no special concessions of any kind. The individual costs of user equipment are negligible. There would actually be a substantial net saving compared with present costs, for assistance in delivering publications, recording taped books, large print and braille publishing, page turning equipment, Jurzwell Reading machines etc. etc.

So Who Pays for Publishing?

Computerised libraries will certainly happen eventually, but all that prevents it happening *right now* is the copyright problem. It was recently made illegal in Australia to establish such a library without the consent of hundreds of publishers for the books to be released on each compact disk, all of whom would expect their royalties.

The reason it was made illegal was because if everyone can obtain publications virtually free on TV screens, or for the cost of photocopying on paper, who is to pay the authors and publishers their royalties for producing the publications in the frst place? If corporations are relucatnt to provide concessions for the disabled when it costs them nothing, they will certainly fight against establishing a system that will deprive them of revenue from able bodied people as well.

Obviously this problem can be solved. Funding systems like "Public Lending Right" have been developed to pay authors and publishers for the reduced sales of publications because of borrowing from libraries. Free public libraries do not need to charge fees for borrowing books because these schemes rely on general taxation revenue levied in proportion to capacity to pay rather than as a charge for the numbers of books read, even though authors and publishers are paid from the fund according to surveys showing the approximate number of books borrowed.

Such schemes could easily be developed to completely replace royalties as the main system for funding publication. Similar developments

have already occurred with levies on gross earnings of radio stations to pay music producers for the broadcast of their material, without any charge to listeners according to the amount of time spent listening.

Broadcasting has been developed with methods of funding, both public and private, that do not rely on coin-in-the-slot devices to prevent disabled people viewing or listening without paying.

But it will take years or even decades to develop such a system for publications in a piecemeal way, while copyright royalties remain the dominant approach. (And if it happens piecemeal it is likely to involve stupidities like commercial advertising added to the price of goods to pay for broadcasts, instead of a taxation fund paid directly to commercial stations in proportion to their audience size.) Meanwhile, the wider extension of videotext networks that would reduce their cost for all is being held up by the lack of this sort of useful information on them.

Of course disabled people can wait for the simple measures that could radically transform their lives through instant and flexible access to publications and communication via computer networks. So can all those community organisations and individuals who simply cannot afford to use the same databases and information processing technology that are freely available to business executives. We have been hearing about the Information Technology revolution for more than a decade now, so it is bound to actually happen one day.

But there is a no need to wait. Disabled people looking for employment opportunities should seriously consider working in the field of information technology itself, to accelerate the transition to a computerised library system. If books can be recorded on tape for the blind without paying royalties, why couldn't they be stored on computer databases and compact disks for use by the blind and other disabled people? Would anyone dare prevent this?

Cheap copies of expensive computer systems are avaialble for a fraction of the full price, and computer software costing hundreds of dollars in Australia is available in singapore, Hong Kong and Taiwan for a few dollars per disk. Since the necessary equipment and software for disable people has already been developed in the United States, who is going to prevent a co-op run by disabled people from producing cheap copies here?

The situation is so ripe, that it should be possible to obtain funding for projects that will pay for themselves very quickly and will open up major opportunities for people who are not able to work at all at present. If Governments won't fund it, the commercial possibilities are so clear cut that bank funding should be feasible. How could anyone refuse funds for a project that would pay for itself almost immediately from the salaries earned by people previously unable to work, or to work at well paid jobs?

While emphasising that the failure to implement computer systems useful to the disabled is criminal irresponsibility on the part of the powers that be, its not enough to just sit back and whinge about it. Disabled people are not entirely powerless. If they wait for the new technology to trickle down it will be their own fault for waiting. If they act now to accelerate it, the fruits already potentially available could be delivered at least 5 to 10 years earlier than by waiting.

The possibilities described above are not part of some distant future. They are happening now in the United States, which is 5 days away by regular airmail. A small project to break through the inertia would be sufficient to ensure Australia trails behind by a couple of weeks instead of a couple of years. A serious political campaign by disabled people's organisations could accelerate the whole process by up to a decade.