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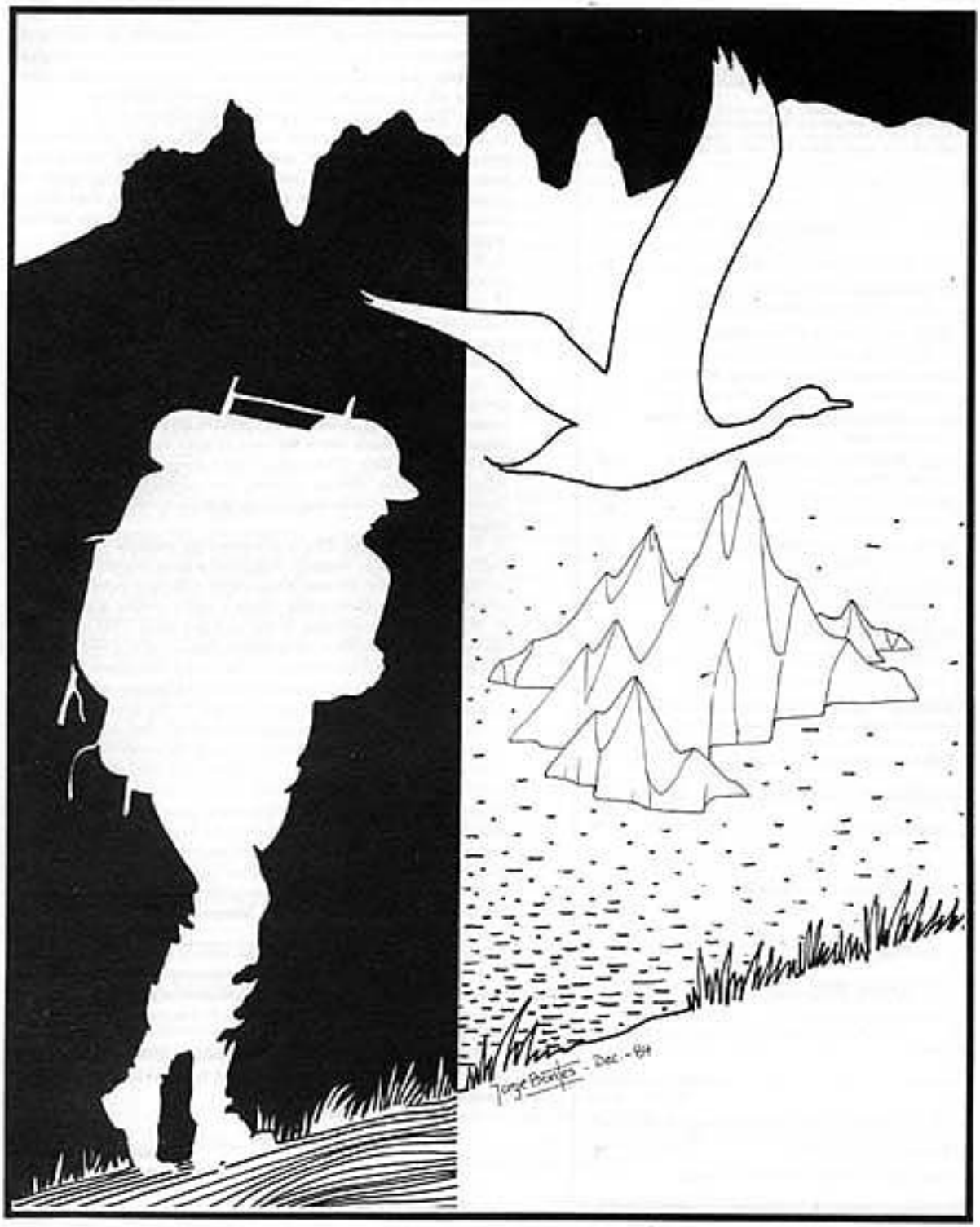

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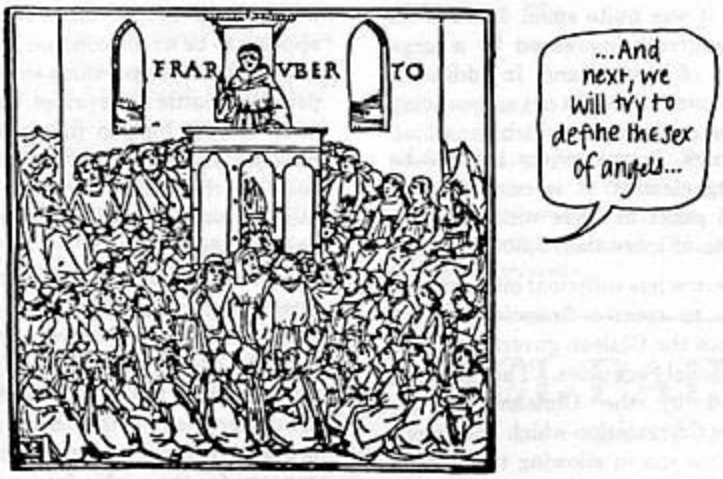
THE GOOD, THE BAD AND THE UGLY

Tony Stewart

John Hill's article in *Bogong* (5(4)) described the current potential of micro-computers for conservation groups. John's article stirred fierce rebuttals in the following *Bogong* (5(5)).

The present article attempts to place micro-chip technology in context. In the title "the good" is the technology because it is appropriate and able to empower large numbers; "the bad" is the inappropriate ways in which those in power attempt to use it; "the ugly" are potential scenarios which could arise if the inappropriate uses are not combatted.

I believe that activists must become familiar with this technology to be effective, those that do may be leading parts of societal change, those that don't will languish in the eddies of history. Becoming familiar with micro-technology is equally as important as exploring new forms of social contract, organisation and interpersonal communication.



A LESSON IN HISTORY

To begin, two concepts, that of social project and leading part.

A "social project" is a quality of every settled society. It is the pattern of beliefs and values whose pursuit gives the society its distinctive character.

A "leading part" is that part of a complex living system whose goals tend to be subserved by the goals of other parts. In stable conditions, the leading part is easy to detect but during instability or turbulence an emerging leading part is often disguised.

For example, in the Middle Ages in Europe the social project was Religion and the leading part the Church. In those times pedlars and userers were marginal people, tolerated but despised. About five or six centuries ago things began to change, slowly and with vigorous rearguard action by the Church. The new social project became economics and trade - the pedlars and userers came into their own. By the beginning of the seventeenth century a new leading part had emerged, Capitalism, and a new social project was in the making, Work.

Since the rise of Capitalism and Work (and before then), economic growth and recession has conformed to a 40-50 year cycle, the emergence of each cycle seemingly accelerated by the availability of a new and cheaper energy source. Thus the first cycle, 1790s to 1840s, is characterised as the age of textiles or machinery and took off on the over-shot water wheel. The second cycle, the railway age came with coal; the third, the age of electricity (or from its major derivative, the age of chemicals) on electricity. The fourth, the age of the internal combustion engine, electronics or plastics, was powered by oil and natural gas.

At the moment we are at the point of transition, not only to the fifth cycle but perhaps to a new social project from two hundred years of industrialism based on capitalism and work. Micro-technology could well be the new "leading part" and the new energy "source" for both these changes.

It was thought that nuclear fission would be the power source for the fifth cycle but it is no longer of promise and fusion is too far off. In 1978 Emery predicted that the leading technology of the fifth cycle would be the micro-processor both in new generations of "smart" devices and in providing an alternative to a new energy source through its ability to radically improve the efficiency of existing sources.[1]

But before examining the qualifications of micro-processor technology for the roles I have given it, it is necessary to look at its emergence from main-frame computer technology and the differences between the two because many criticisms of the former are based on the evils of the latter.

The development of the main-frame computer and that of nuclear power grew almost contiguously from the late 1940s which is not surprising as they conform to a similar ideology.

The ideology behind main-frame computer systems was that information from a vast array of source points could be funnelled into a central processing computer, decisions made and commands sent from the top down to the bottom of the hierarchy where actions needed to be taken. Vast central computers could be used for social and industrial control and regulation, surveillance, intelligence assessment etc. Fortunately, these systems don't work as hoped, for reasons to do with the dynamics of information transfer between levels in a hierarchy and because what actually happens at the coal-face, on the shop floor, at "grassroots" is not understood and cannot be understood in absolute terms.

The micro-chip revolution emerged from the military and the needs of the electronic battlefield, so that rather than having a multitude of expensive missiles which usually missed, they developed a smaller number of "smart" missiles which didn't. From the mid-sixties to about 1975 the development of the micro-chip was trapped and deformed into attempting to serve and to solve the problems of the centralised computer ideology.

By 1977 the micro-chip had broken free of its dinosaur cousin and we have seen a revolution in hardware (physical devices) which is continuing to accelerate in 1984. Unfortunately software (programs) has lagged behind and is still embedded in the myth that micro-computers and micro-processors are merely a development of main-frame technology. Why? We must remember

that the information sector which only arose in the fourth cycle was born in an artificially structured market for skills and developed on the assumption that computer supported devices must be programmed, operated and maintained by a priesthood of highly certificated workers. With micro-computers this is no longer the case.

THE LEADING PART

Why are micro-processors different from nuclear reactors and main-frame computers which were also hailed as technologies of the future? Micro-processors, through handling information, have an impact on almost everything they touch – all mechanical processes, energy, work; they are ideally suited for the decentralisation of power – anyone can use them not just a priesthood; and they are cheap.

The mass production of micro-processors and their associated hardware has led to accelerating cost reductions which are being passed onto the consumer. A BBC program on computers gave the analogy that if the VW had developed as rapidly it would now do a trip to the sun on five litres of petrol and would cost only one dollar.

Mechanical processes: Micro-processor systems have the "Midas Touch" in that they reduce the cost of just about every machine system they come in contact with and in the majority of cases give spin-off performances that were previously desirable but too expensive to contemplate.

The reason is that micro-processors and associated devices can, theoretically, be used to replace all electro-mechanical devices. Electricity since its emergence has ultimately been limited by the defects of mechanical devices from brass light switches to motor drives which must be more and more precisely engineered in order to convey more information. Hence they become more expensive and they wear out, causing high maintenance and replacement costs.

Micro-processors are "smart" in their ability to diagnose what is happening in the machine or device they are working with and in the environment of that machine. What this means is a cheap way of making machines and interdependent sets of machines able to act "purposively" (to the limit of our ability to identify the operating parameters).

It is this last characteristic of the micro-processor which is revolutionary in a positive human sense. Micro-processors work best at the "grassroots" level, the work-face, the shop floor and are at their best in interactive mode, that is, exchanging two-way information at that level. They work most inefficiently when programmed or controlled at a distance from the work interface. Being "smart" promotes decentralisation and feedback. The necessity for being interactive promotes the development of software which requires no specialist training to use.

Energy: Soft energy and hard energy paths are often used erroneously to imply low technology and high technology, respectively. Appropriate technology may be either high or low.

For example, Jim Harding in his recent visit to Australia showed that with the incorporation of micro-processors in lights and motors (which normally account for 85 per cent of electricity used) electricity usage can be cut by incredible amounts in various devices. Examples of such "smart" devices are: the current being used to light commercial buildings decreases as the sunlight comes in the windows; the current going into a lift motor will be proportionate to the number of people in the lift; and refrigerators are being developed which will only use amounts of electricity necessary for the amount of food in the fridge so that the appliance need not throb away on behalf of a lone carton of yoghurt. The energy saving implications are extraordinary. Without restructuring energy use, Harding has shown that total energy use in the US by the year 2000 will be much less than it is today. (see *Canberra Times* 27 June 1984).

With more intelligent use and restructuring of current wasteful technologies the potential for energy conservation is mind boggling. Solar collectors can track the sun and become remarkably efficient even when made of cheap and relatively inefficient materials, with the addition of a micro-processor(which may cost from $1 to $4). The capital cost and maintenance of wind generators is drastically reduced by replacing electro-mechanical transmission with electronic transmission. Further, and more important, micro-processors offer a way to integrate wind and solar energy generation with common high level energy storage.

Work: Work is such an ingrained concept that its industrial definition is rarely questioned. The shrinkage of the workforce is a long-term trend in industrial nations. The micro-chip revolution is not a cause but will be an accelerator, even though its impact has been slower than predicted. Many people believe, however, that it will not be long into the 21st century before only a quarter of the population will be needed for work as we know it[2].

The key phrase is "work as we know it", which is employment in the mainstream sectors of the economy and as defined by 200 years of industrialism. There is no shortage of socially useful work in our society though much of it is underpaid or unpaid. When only 25 per cent of the labour force is needed for national economic production, there will be the same if not more wealth to distribute.

The last point is the most important. Loss of jobs in the workforce as conventionally defined, does not mean loss of work, but it does mean loss of livelihood, unless the means of distribution of buying power is changed.

CENTRALISED v DECENTRALISED USAGE

Telecom has recently installed centralised computer exchanges throughout Australia to replace the old electro-mechanical exchanges. They could have installed micro-computer terminals in each handset at cheaper cost[4] but the social implications and the power implications are such that such a development will be a long time in coming. The benefits of the two are as follows:

Exchange computer	On-phone micro-processor
Absorbed in self-regulation	Spare capacity
Programmed for pre-determined classes of service	Personalised to extent required
Dependent on expensive high level programming	Operates on cheap low level learning programs, available in the market place
Subservient to the national telephone system; can be made to serve "national" ends	Can be programmed to hinder external examination
Dedicated to purposes of the system	Multi-purposes; spare capacity available for other household uses

This comparison taken from Emery, Fred. 1978. "The fifth wave?" in *Limits to Choice* Centre for Continuing Education, ANU, Canberra.

The question is a social one. Fighting against or ignoring micro-processors is not going to help. The thing to fight against is inappropriate uses of the technology, which help to produce further inequalities of wealth. The only positive way to do this is to use micro-processors for the purposes to which they are uniquely suited, as interactive tools for people, soft energy applications and the decentralisation of power.

UGLY SCENARIOS TO HAVE NIGHTMARES BY

These are but two examples on maladaptive trends. They are logical extremes of some current trends, though intermediate stages have undesirable consequences. All are the result of authoritarian and centralising tendencies which, as H.C. Coombs shows in his analysis of the forces driving economic and political strategies, are likely unless other equally potent forces arise to combat them.[3]

The industrial elite: One quarter of the population are supported by working in a traditional industrial structure. They live in comfort in guarded estates near their workplaces. Head offices are still in the centre of cities, containing large heavily guarded computer complexes. The "captains of industry" live in rural isolation and splendour connected with their head offices by remote terminals. Three quarters of the population still live mostly in the cities in the midst of crime, violence and squalor, surviving on the crumbs of the industrial elite. There is some terrorism but it is contained in the cities by ruthless and efficient police.

Plastic surveillance: Cash is rarely used except by fringe dwellers in a mainly barter economy. Plastic cards are used by the majority of citizens for all exchanges of credit, these are kept track of by hidden computers. Other information is also kept on these cards. Computer records are available for scrutiny by all government agencies. Civil liberties organisations are easy to suppress by soft means usually involving credit anomalies. Centralised "smart" devices are unavailable to ordinary citizens and such devices in business and government are used for specialised input and output to a centralised computer network. The hardware does not allow general applications outside the centralised net.

WHAT CAN I DO?

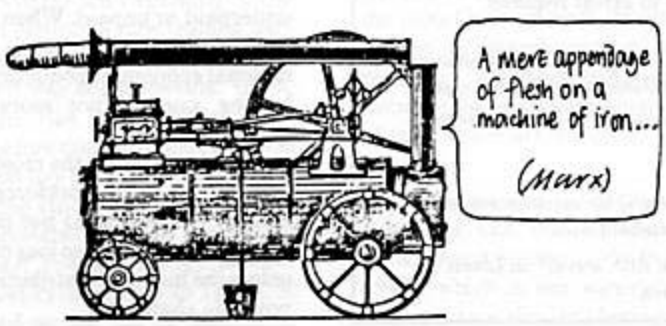
There are two approaches for the activist wishing to use micro-processors towards idealistic ends by morally acceptable means.

The soft approach: Become familiar with the technology (wordprocessing for example will aid your campaigns). Use your knowledge of micro-computers to fight for health standards and pre-introduction research into potential safety hazards, fight for appropriate applications of the technology (e.g. to save paper and energy) and against inappropriate applications and abuses (e.g. those against civil liberties).

The Rainforest Information Centre and Rainbow Bus are now both using micro-computer word processing as an effective tool.

The hard approach: Emery in 1978 estimated that about 90 per cent of young people would be equipped to enter the information sector. That holds true for the subversive information sector, which is why we see such headlines as: "Computer prodigy arrested for piracy", "The 'toys' that are being turned to crime", "FBI chases young computer spies". These are often patronising articles about teenagers who break into a bank or security computer systems often without malice. One group even broke into the American Atomic Energy Commission's databanks. They confirm Emery's contention. Indeed, the highest paid programmer in the US is only 14 *(Canberra Times* , September to November 1984).

Micro-computers are a wonderful subversive and disruptive tool. They can be used to obtain information which would be difficult to obtain otherwise, to pass information on and to store it in publicly accessible databases.



CONCLUSION

Micro-processors and micro-computers are accessible to and usable by ordinary people, they decentralise, tend to devolve power and have a remarkable ability to conserve energy.

Current applications of micro-computers are a bit limited. Word processing programs and spreadsheets for the manipulation of numbers are the best software available, apart from communications software. They are not particularly "friendly" and take a while to master. Nevertheless now is the time to learn about computers because extremely interactive languages or "artificial intelligence" programs will appear in the next year or two. Though these programs will remove the need to learn complex programming languages, they will be best used by people already familiar with the idiosyncracies of micro-computers.

Cheap general use hardware with memory, into which you can burn programs with your home micro-computer, will also be more readily available in the next few years. These will give you the ability to develop your own systems of mechanical control, for example, to automatically activate shutters on your solar house or even to make a remote control unit for your TV.

The environment movement is too often characterised as re-active or negative. The ways in which we use micro-processors can create positive examples of new ways of doing things which will proliferate and lead to a better society.

References:

1. Emery, Fred. 1978 "The Fifth Wave?" in *Limits to Choice.* Centre for Continuing Education, ANU, Canberra. *Gives more detailed argument on the micro-chip revolution which the author has drawn on extensively.*

2. Stewart, Tony and Heinrich, Ludwig. 1982. *Alternative Training Strategies.* Mimeograph. *Gives details on Australian situation.*

3. Coombs, H.C. 1979. "Economic change and political strategy" *Social Alternatives* Vol.1 No.4.

4. Young, David. "Telecommunications as ecosystem: an Australian case study" in *Telecommunications Policy* September 1980.

Summary of a talk given at the Environment Centre on 30 October 1984. Section on health aspects and two ugly scenarios, Privatised Living and The Media Newscast, were omitted due to lack of space.

Drawings from Marx for Beginners, *London, Writers and Readers Publishing Corporation, 1976.*