limited, and the fact that the IBM personal computer is not mentioned is regrettable.

One wonders what the purpose is in 1983 for including a description of a word processing package in such a book. The best advice to any one wishing a description of a word processing system is to have a practical demonstration. The treatment in this text is superficial. Subjects handled by the author should have included: what is the cost effectiveness of word processing; what features are required; what are the limitations of various well known packages; what effect will a word processing package have on the organisation and processing flow of a small business?

Visicalc has become a household name synonomous with 'electronic worksheet'. This approach can be used in areas such as planning and budgetting, market forecasts, financial modelling, financial statements, stock valuations etc. The treatment in this area is excellent with examples of stock portfolio, cash flow, forecasting etc. Being a United Kingdom text the payroll packages investigated are quite specific, with examples included of Bank-Giro, the British tax scale, and specific tax forms. The treatment of stock control is comprehensive and gives a user, not familiar with such packages, a good feel for their scope and application. It is indeed unfortunate that the package for sales, purchase and nominal ledger is specific to the UK environment. The emphasis on value added tax (VAT) detracts greatly from the chapter. Those familiar with the term 'data base' on larger machines link the concepts of data base to hierarchical record structures, Codasyl or relational theory. In the micro-computer world, the term data base has an altogether different meaning.

The publishing of this book is timely for those in business wanting to come to grips with the mighty micro, and who wish to examine ways that they can use it in their own business. To such persons, it is an excellent primer. However, like all such texts, of its nature it will have a short life span as new hardware and applications are released. Furthermore, much of its material is oriented to the United Kingdom. In summary then, while texts such as this serve a very real purpose, it is unfortunate that the author did not include subjects such as cost justification and personnel considerations. In general, the book does not live up to its title, *Managing with Micros*.

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## **Micro Invaders: How the New World of Technology Works**, by Ian Reinecke

(Penguin, Ringwood, Vic., 1982), pp. 272, \$6.95.

Technological change and the 'new technology' of microelectronics have received a good deal of coverage world wide in the last five years. In Australia, industrial disputes over the introduction of new technology, a government inquiry into the effects of technological change, and a well publicised and breathtakingly rapid spread of new technology have served to focus attention on the nature and effects of the new microelectronic technologies. The issue has become one of intense ideological debate and heat, full of assertions based on little or no information.

The saturation coverage in the media, especially during 1979–80, served to illustrate a number of features. First, the debate has been marked by an at times hysterically emotive tenor. Looking back through clippings of the time, one is struck by the frequency of terms like catastrophe, holocaust, annihiliation and other apolcalyptic allusions, as opposed to visions of a cornucopia of leisure, wealth and dazzling frontiers. The lack of hard evidence is striking. 'Gee whiz' and extremely technical discussions of the technology abound. What has been lacking overall is a basic enumeration of the issue — the number and usages of the technologies, where they are deployed, how rapidly they are disseminating, and some quantification of the effect in terms of productivity, output and jobs. On the other hand, in depth analysis of the technologies and the effect on industry and policy of the standard produced by the Science Policy Research Unit in the UK, is singularly lacking.

Ian Reinecke's book has as its objective to show "How the new world of technology works". It has the laudable aim of serving as an information source to a broad readership, to make intelligible a perplexing series of technological developments with broad economic and social impacts and to highlight their interaction. As such, the book has a number of precedents in the UK and US. However, that is not to say that this book presents a set of facts and allows readers to draw their own conclusions; it is a work of embattled advocacy.

The author takes a stand against what he perceives to be an aggressively promoted orthodoxy of technological change at all costs. "This is an heretical book about technology" (p. 1). He opposes what he sees to be the deification of technology. His trinity is that of the 'technology booster' (the priest), those seekig the managed benefits of technology, the 'pragmatic utopians', and the 'conspiracy theorists', who perceive the liberating potential of technology. His reader is the 'natural sceptic' to whom he seeks to impart information and knowledge, the 'most valuable weapon'' and ''so armed, the techno sceptic can strike back'' (p. 8). At one level it is a work of advocacy for the converted.

The underpinnings of the author's stance are that technology is not neutral, that it does not operate for social ends, that people are to be valued above machines, that the primary feature of microchip technology is control, and that significant numbers of people are being dispossessed of their primary asset, their jobs. Reinecke believes an enormous inequality will result; not only will jobs be lost, but also access to information will be limited. The benefits are held to be illusory.

Having enunciated his values and the parameters of his discussion in the first chapter, the author examines the essence of the microprocessor, the microchip. Chapter 2 is useful in that it explores something of the background of the evolution of the microchip and its exponentially increasing function and decreasing  $\cot t$  "The chip does more for less" (p. 26) — tying in its technological and commercial dimensions. What the author does not do at this point is satisfactorily define the nature of technological

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change and its mechanism. Technology is used interchangeably with computer and microchip. Notwithstanding the microchip's revolutionary features, the bulk of technological change is additive. With the author's objection to the mechanism of the introduction of technology (p. 260), it would have been useful to spell out these mechanisms.

The bulk of the book describes the effect of the usage of micro technology on a number of key sectors of society — communications (the telephone system, television, printing and satellites), the banking and retail sectors, office work in general, effects on home and school and the factory, but curiously leaves out the major market, the public sector. He examines the implications of these technological developments for the role of information in society and finally addresses "electronic dreams and nightmares", arguing that the promise of technology is largely illusory. Reinecke's overall view of the microchip's impact is bleak. He perceives:

- a new Technocracy
- control and monitoring as the chief characteristic of microchips, aided by the convergence of technologies and functions,
- standardisation of work, de-skilling and less discretionary power;
- integration of design, production and distribution which will effect more than direct labour displacement.

The stress on communications is understandable. The revolution in the communications system is the main impact of the microchip. In addition, it is this area that has seen industrial action over the introduction of new technology. Printers, telecommunications technicians, journalists, and the author himself have been involved in dispute. The implications of the communications technologies are seen to be increasing control and decreasing discretionary power. The developments in the telephone networks and satellites are geared to business efficiency and intercomputer communication, with the PABX, digital switching and transmission and, ultimately, the 'intelligent telephone', as the cornerstone of employee monitoring and control.

The importance of the developments with television lies, in the author's view, with its role as the public's most trusted information source, and its interactive potential with videotex. Not only is information now more accessible, but it is possibly to carry out an enormous variety of commercial transactions from the home, and to provide new ways of manipulating information. Satellites are seen as a 'communication freeway' and an intensely political issue, in terms of telecommunications and television. An important consideration is the battle for control between public and private interest and between large companies. The situation in Australia is usefully discussed. The importance of the satellite will be to vest control of the most profitable parts of the communications network in private companies, with the less profitable 'back alleys' left to Telecom. The beneficiaries will be the large corporations, establishing private national and international networks.

In the financial institutions and retail outlets, the use of computers for information storage was realised early. The microchips enable monitoring of staff, stock control, credit control, market research, and hence reduce sales and clerical staff in real terms. One objective of the use of bar codes is to down-grade price as a basis of choice. The convergence with communications technology brings the day of television shopping closer and the convergence of shopping and banking.

For the whole office work sector, Reinecke points to a proletarianisation of work, like the process that overtook the assembly and blue collar areas. Again, the control, monitoring, convergence and standardisation aspects of the microchip are stressed, a process that impinges most directly on the female workforce and, in the longer term, on the very personnel that computerisation created, the programmers (p. 166).

In terms of the impact of microchips on the home, Reinecke paints a bleak scenario of a suburban wasteland, "unlikely to be reduced in the electronic home" (p. 172). The trend of self service replacing bought-in services, and the increasing ability to conduct many transactions and activities via a home terminal will contribute to greater isolation and introspection. With regard to microchips in factories, Reinecke sees the effects as a further step in the de-humanisation and de-skilling of blue collar work.

The final two chapters encapsulate the two major concerns in the author's thesis, information and the lack of benefits for Australia. Information and its dissemination is seen as the basis of democracy, and access to information will determine the haves and have nots. Citing the Japanese, Reinecke argues information must become a matter for public policy; neither market forces nor the technology itself will guarantee public access (p. 233).

The next chapter looks at Australia, and finds little comfort in the optimism (albeit cautious) of the Myers Committee. The Myers Report epitomises the 'techno pragmatic view', the system accommodating the strains and stresses of new technology. Under the heading of 'Illusion' the author discusses high technology industry in Australia and yet again the scenario is bleak. He cites the lack of an electronics industry in any real sense. The dismissal of the electronics industry (p. 247) is misleading. Like much of present day manufacturing, it was not always thus. The industry's enfeeblement owes much to tariff dismantlement and structural change.

With regard to an Australian Silicon Valley, the author rightly points out that the US and Japan "have the game tied up". Reinecke then dismisses CSIRO's VLSI program as a cottage industry (p. 250). However, the linking of the program to "utopian theses that new industries will be created by the microprocessor" (p. 250) is not the whole picture. Clearly, CSIRO has organisational objectives of scientific and research excellence. The NATSEMI proposal for Canberra is correctly indicated to be another form of the standardised branch manufacturing, imparting fairly low levels of skill and, after the initial construction phase, limited jobs (p. 251). Technology transfer is not *per se* an objective of such companies and without tight bargaining and concessions, is unlikely to be an outcome.

Customised chips are seen to be limited in market potential and dated (p. 253), although the two do not necessarily go together. It is the commercial strategy of a significant number of firms. Software developments are seen to be limited by the trend of manufacturers to incorporate software

packages (a case of standardisation in a mature industry). The proletarianisation of programmers has begun (p. 256).

The book takes us to this point and no further. There is no discussion of policy, neither precedents nor proposals. Instead of a conclusion, there is an epilogue. In it, there is reference to anger and outrage and the question "What do we do about it?" The author suggests the "exercise of scepticism", insofar as the price of new technology requires scrutiny of the promises, assurances and language. The prerequisite is to be armed with knowledge. The book succeeds at the level of being immensely readable with bold type extracts that summarise the author's key points. The interrelation of communications technologies, convergence of technologies and their background is well set out and understood by the author. It is a useful bringing together of a very diffuse range of information.

However, there are a number of problems with the book. The partisan approach seems to presuppose some understood epistemology. And some of the language — 'commandant' of the Myers 'gulag' (p. 137), technological 'commissars' (p. 160) — over-emphasises the case. By its own criterion as an information source, the book has shortcomings; it is a primer for 'techno sceptics', but not an analysis. Having set the partisan parameters of his discussion, Reinecke does not impart a structure to his arguments, which is probably why no conclusions emerge. What also tends to confuse the information is the discussion of the technical potential of various usages of microchips interspersed with their commercial applications. The uninformed techno sceptic could be forgiven for confusing the actuality with the potential.

There are some surprising omissions. The automaticity of productivity improvement is a contentious issue, theoretically and in practice. Managerial ignorance and poor decision making indicate substantial problems with the equation. The public administration sector is the biggest buyer of these technologies; the dimensions and indications of that should be central to the thesis of the book.

The books lacks context. Apart from one reference to the use of microchip technology to trade out of recession, Reinecke does not discuss the effect of recession and structural change in an economy on the diffusion and implications of technological change. With the painful dismantling of most of an industrial structure, high technology industry clearly has emerged as a priority area for investigation and policy. The enhancement of competitiveness of industry by the adoption of these new technologies needs to be examined. By far the greatest impact of microchips is via process innovations, not only product innovations.

There appears to be some confusion about the effects of the technology itself and the mechanisms of introduction. The effects of the technology are supposedly embodied within it, and yet the concluding sentence of the book is that the main objection is to "how the technology is being introduced". A wide variety of policies and possibilities exists that deals with the transmission of technologies; their omission merely confirms the boosters' convictions about the immutability of technological change.

As a final comment, the book puts across a mixed message. On the one

hand, the author implies the march of technology is not inexorable. However, the absence of indications of direction says the opposite. Australia is very much a test market for these technologies; it could be seen in a similar way with respect to policies to deal not only with the *strains* of technological change, but also more positively, with its *directions*.

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