In 1950 Turing posed the question "can machines think?" and answered it in the affirmative, even if at the time this could not be realised. He originated the metaphor of the mind as a computational machine which is the fundamental assumption of AI and has since come to dominate cognitive science. Turing arrived at the conclusion that there was, in principle, no difference on theoretical grounds between the power of the human brain and that of a computer. Pratt describes the development of mathematical logic and cybernetics that formed the basis of Turing's thought; Turing himself contributed to its further development.

In the concluding chapter, Pratt sees the emergence of AI as the result of the triumph of formalism over content in the last three centuries. Regrettably there is in this very good book no discussion of the intellectual controversies to which this triumph has given rise as the conceptual progress of AI has slowed down. The economic potential of the application of AI in expert systems (on which so many AI researchers now concentrate) can be exploited, even if none of them so far can pass the Turing test. What about the future? Pratt, perhaps wisely, offers nothing but that tantalisingly brief and ambiguous last paragraph of his book.

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Challenges and Change: Australia's Information Society *edited by Trevor Barr* (Oxford University Press, Melbourne, 1987), pp. viii + 188, ISBN 0-19-554855-8.

The study of the information society has been popular among sociologists in the last three decades, as a way of analysing the change of a society from an industrial one to a post-industrial, or information-oriented, society. Since the early writings of Daniel Bell, Yoneji Masuda, and S. Nora and A. Minc, many social scientists have written about this change.

There is also another line of analysis, namely, an economic one. This approach studies the economic change of society at a macro-level, observing that in most of the developed, industrial countries there has been a massive change from an economy based on manufacturing industries to an economy based on production, processing and distributing information and services. This sector is the fastest growing one of an information economy. The pioneers have been Fritz Machlup, Mark Porat and Michael Rubin with their analysis of the US economy, and Kenneth Arrow and Don Lamberton with their writings on information economics.

Both these lines of thinking have contributed greatly to the present understanding of the information society. One of the latest examples is **Challenges and Change: Australia's Information Society**. It is a collection of articles written by Australian economists, social scientists and government officials about issues related to the Australian information society. The book has a clear message: Australia has turned into an information society, increasingly dependent on information and information technology. This has produced a number of problems, such as privacy, access to information, dependency on

imported high technology, and the development of national industries. The book is about how to manage these issues; how to develop Australia's economy and society in the hi-tech world; and how to formulate management policies, keeping in mind the rights of private citizens. Clearly, the book has a critical orientation to the world of information and high technology with its disappearing boundaries between countries.

The book begins with economic evidence that Australia's main economic growth takes place in the information services and industries. First, Barry Jones gives an overview, but does not fail to raise social issues like whether there is enough understanding for usage of information technology, who has access to it, and whether access is a privilege of the well-educated. He sees Australia's future to be in the growth of production of information technology equipment, and in information services. These issues could be managed, according to Jones, through a national information policy, if well formulated. The article is critical but at the same time optimistic, especially about the role of information policy measures to develop an Australian information society.

Lamberton gives a brief introduction to the economic theory of information. An economy can be seen as an information system, where, for example, the price system is a mode of communication, and information is a commodity. Access to information reduces uncertainty about decision-making, but information also provides control. The information economy model presented in Lamberton's chapter is a modification of the traditional input-output model and allows for identification of a separate information sector in the economy. Since the work of Porat and Rubin this kind of analysis has become a basic model of the information sector, dividing information industries into two categories: the primary information sector, i.e. those goods and services that are traded, and the secondary information sector, i.e. information goods and services provided in-house.

The information sector analysis gives information about two things: employment and value of production. Additionally, an important point in information industry analysis is the shift from the secondary information sector to the primary one, and for understanding of the implications of that shift. Lamberton makes it clear that economic theory has greatly benefited from information economics. His contribution is important, the emphasis being on the economics of organisation. It should be noted that, based on the information sector analysis, 41.5 per cent of Australia's economically-active population were information workers in 1981 and the primary information sector contributed 36.1 per cent of the gross domestic product. Lamberton's chapter gives an important introduction to information economics, though the actual data need some clarification.

An international comparison is given by Mandeville in terms of the OECD countries and their information sectors, as well as for some Asian Pacific countries. However, much of the information given by Lamberton is repeated; also the share of the information labour force for 1971 differs from Lamberton's statistic. The author raises an important question about information flow between nations, an aspect which has not been studied sufficiently. He points out that in a policy context the important fact is that information is a source of wealth in today's society, and there should be more investment in people as a resource.

A more detailed comparison of information technology among the OECD countries, and its export/import ratio, is given by Goldsworthy. His chapter

shows that Australia is heavily dependent on information technology imports, the ratio being 0.15 in 1983. Out of 24 countries, Australia was twenty-first in terms of this ratio in 1983. The problem is how to develop the information technology industry to substitute for imports and increase exports. The author suggests identifying industry niches and finding market opportunities for Australian information technology products.

Another indication of the interest in developing information technology is investment in R&D. In international comparisons of this kind of investment, Australia's position is middle rank. Its government is funding more of the R&D than the private sector. The author has an optimistic view, seeing Australia finding its place in the Pacific Rim area as a country of specialised knowledge in information industries, investing more in education and increasing the government's role in this development. He points out several relevant ways of solving the problems of information technology (IT) colonialism, problems which seem obvious and relevant. The issues of Australia's information economy are well covered in this chapter.

What about the citizen's point of view? The members of society are affected by IT in several ways, such as having access to information, the ability to use IT and the ways of seeking relevant information. Some members of society are able to use IT directly but some need general assistance. How to provide sufficient means for access to the information about the community, what information is needed, and how to access it are issues discussed in John Burke's chapter about community information.

A rather futuristic view of the information society is given by Marie Keir in her discussion of the members of this society and their use of IT. Yet the picture is reality today. We are using automated teller machines, and a step further is the use of systems for electronic funds transfer at the point of sale. This development makes us handle our own money transfers, and changes the nature of jobs. Finally, and most important, more information about us is available. All this is not only to our advantage, but also increases the possibility for control. Keir brings up the important subject of misuse of information collected about individual members of the society. Information technology allows for more efficient ways of collecting information, which can also be seen as a benefit to citizens. Legislators and policy-makers have an important issue to address with respect to privacy. After all, it is the people for whom decisions should be made, not technology, as Keir points out.

Much has been written about information gaps in society being increased by IT. Ian Reinecke's chapter has a fresh approach to this "old issue". It is not only the quantity of information distributed in any society, but the quality, and what information is needed. He points out that IT was never intended to be widely distributed in society, but is mainly used by those with specialised knowledge of how to use it. It contributes to the concentration of power in society. Reinecke calls for information policy to look at the issue of use of IT to prevent the uneven distribution of information, so partly overlapping with the previous author's view. It is not enough for people to have access to IT, but they must know how to use it.

The libraries are perhaps the institution most affected by IT. Their organisation has changed and their services have grown. Will libraries survive in a competitive environment of on-line databanks, and should libraries be able to provide the same level of services as private data-banks and information services? If they do, a very crucial problem will arise: should information be free, or should

information services be positively priced? The answer is not given but is discussed in Averill Edwards' chapter. He sees the problem as a very serious one. The solution for the libraries, as information service institutions in society, is to become active promoters of their services. One of the indications of the change in libraries is the education of librarians. They are information managers today. Since the amount of information is growing exponentially, the technology provides possibilities for more efficient storage of information. This, however, requires funds which are not always available. The question is, what is, and will be, the role of libraries in society?

The book finally discusses Australian state policies on information and information technology. These chapters repeat the issues raised earlier about the role of Australia as an information and IT-dependent society. The problem is, how to cope with international developments? Recipes are given but they are rather pessimistic, perhaps realistically.

Some of the international issues such as privacy and transnational data flows are discussed. Privacy and the problem of human rights are addressed by Michael Kirby. He raises much the same issues as earlier about IT and its effects. He sets out ten information commandments, and concludes that technology should be for people, not *vice versa*. A frequently raised international issue of an information society is trans border data flows and their effect on national sovereignty. What is the role of a nation state when international information flows take over? These issues are discussed by John Langdale in his chapter on Australia's telecommunications dependency and international information flows. He argues that Australia is vulnerable and unprepared for future problems.

In the concluding chapter Trevor Barr paints four alternative visions for Australia's development of IT and its reliance on the information industries. He suggests urgent policy measures to make Australia an internationally competitive and less dependent information society.

Challenges and Change is based on papers commissioned by the Commission for the Future in Australia. Ranging widely, it is an interesting collection intended to open discussion about the future of society and what IT means for its members, and what they can do. As the book is a collection of papers, it is to some extent repetitive, some definitions and issues being discussed repeatedly. The data presented in some articles are confusing. A more serious shortcoming is that, although a large part of the information produced in the information sector is produced and distributed by the media, this field is not discussed in the book at all. Yet, one of the world's largest media companies is Australian, owned by Rupert Murdoch.

The book presents a number of questions about Australia's future, and to some extent the articles give an impression of the authors' shared view that Australia should be keeping up at a certain level of IT development and is not doing very well. On the other hand, the authors remind the reader that a society should not be technology-driven, that people should decide their future. The critical approach is there, but the reader also gets an impression of the urge for a hi-tech society. Overall, the book gives an extensive and interesting review of Australian technological development. At the same time, these issues are also relevant to most other post-industrial countries.

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