HOW CAN SLEEPERS WAKEN — AND STAY AWAKE? SOME HOPES FOR THE AUSTRALIAN COMMISSION FOR THE FUTURE

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My initial reaction to the invitation to comment on Australia's Commission for the Future was "Why me — so far away on the other side of planet earth?" My second and more substantial reaction quickly countered the first. Technology is obviously a global concern. The Australian Commission, quite admirably, seeks to promote community awareness and understanding of developments in science and technology. Perhaps, in addition to promoting such awareness and discussion within Australia, the Commission might also do so in the wider, global community, at little or no extra cost. Such awareness is increasingly needed. And thus I heartily encourage the attempt to waken the many sleepers of Australia and perhaps the world.

Australia may be well-positioned to make a significant contribution. First, there has been little outstanding public or quasi-public futures thinking in the past few years (the *Global 2000* report to President Carter in late 1980 is the last statement of any significance, at least in North America), thus creating a vacuum that could be easily filled. Lest Australians feel outnumbered, with a population less than one-fifteenth that of the United States, it should be remembered how quickly the Australian film industry found an audience for both quality films and mass appeal films in America. (Indeed, as this essay is being written, *Mad Max, The Road Warrior* — which depicts one vision of future technology — is being broadcast over NBC network television!)

More specifically, the focus of public futures thinking in recent years has been on the population/resources/environment set of issues, beginning with the Club of Rome's *Limits to Growth* study in 1972. Although these isues have hardly disappeared, the temporary sense of well-being brought on by the present world glut of oil and falling oil prices has encouraged a de-emphasis. At the same time, the flourishing of several technological revolutions, accompanied by widespread acritical 'high-tech' enthusiasm, invites a compensating public examination of technological threats and promises.

Thirdly, the Commission has solid support from the Australian government, and a Minister for Science, Barry Jones, who has himself capably addressed many of these issues.[1] Conversely, so-called conservative regimes (such as those now in power in the US, Canada and the UK) view technology as an object to be promoted in a hotly competitive race for national well-being, rather than a concern that should be studied, widely discussed, and perhaps steered toward some notion of the public good. Under free market or conservative regimes, flourishing technology of any sort, especially that which seemingly helps an unhealthy economy, is equated with progress and well-being. Ironically, such Faustian regimes do not exhibit the caution that one might associate with a conservative stance.

Finally, Australia's geographic distance from centres of high-tech activity may in subtle ways provide a valuable perspective from afar. Moreover, the Australian character of being blunt and feisty may lead to raising important questions that others are too timid to address.

What signal constributions can the Commission make to global thinking about technology? My hopes are that four simple and fundamental observations — at the least — can somehow be addressed and communicated to the broadest possible audience:

1) We Are in the Midst of Multiple Revolutions

The communications revolution is the most obvious of these, involving computers,[2] robots,[3] satellites, cable television, video-cassettes, mobile telephones and new and better receivers for this plenitude of messages.[4] Indeed, the overload of information or 'Age of Infoglut' resulting from these new technologies could easily prove to be the most powerful of all of the many impacts that are just beginning to be felt. The biotechnology revolution, with its promise of creating new life forms[5] and reshaping human beings,[6] appears to be only in its beginning stages. And the social and ethical questions that follow in its wake are also new.[7]

We are in the midst of an energy revolution, in which we seek alternatives to oil and more efficient ways to produce and use oil and other energy sources. The costs of energy to power our civilization have undergone a dramatic change in recent years, but the forms have remained essentially the same. This may not continue in the next decade or so; possible breakthroughs in any of several technologies (photovoltaics, fusion power, hydrogen production from water) could change the ownership, cost and distribution of energy. Another ongoing revolution is taking place in new materials that are stronger, cheaper, lighter and more durable.[8]

Most important of all is the weapons revolution that is accompanying the process of worldwide militarisation. Nuclear

weapons, of course, have received the most attention for their potential to destroy life on earth.[9] But even conventional weapons have been improved in their accuracy and destructive power.[10] Potentially, a very great number of people could be hurt or killed, intentionally through war or terrorist acts, or unintentionally through some accident. Some argue that, even without detonation, the expenditures for military hardware are severly distorting the world economy.[11] To head off the most frightful of these prospects — airborne nuclear weapons — the Reagan Administration has recently initiated its Strategic Defense Initiative, or 'Star Wars' as viewed by its many detractors. Indeed, the effort to build such a space-base defence could well be the greatest ill-conceived technological fix of all time.[12]

In sum, despite the breadth of each of these revolutions, it is nevertheless an understatement to look at only one of these clusters of technological advance. We truly live in an era of multiple transformations — many technologically induced — but we seldom consider this plurality of forces in any serious way, and how each potentially and actually interacts with the other. Moreover, there is no end in sight. As Alexander King notes, it is probable that we have only seen a small part of the applied products of recent research.[13] As viewed by E.E. David, Jr., science and technology is entering its most buoyant period, with the pool of working scientists and the pool of knowledge expected to double in the next 30 years, as it has already done in the past 30 years.[14]

2) These Revolutions Are Not Well-Understood, and There is Little Institutional Capability for Developing an Adequate Understanding

The development of technology has a comfortable home in the research university, increasingly aided by joint ventures of corporations and universities (at least in the US). The forecasting of technology, assessment of its consequences, and debate over options to shape it for the public good are not well-received by universities because such concerns cross the entrenched boundaries of the academic disciplines and professions. To provide only one example, a recent synthesis of social science research on computer impacts concluded that our knowledge remains seriously inadequate to the significance of the subject, and such research "receives minimal infrastructure support within the academic social sciences".[15] Moreover, the author continues, "the technology has been characterised by such extraordinarily rapid and dramatic changes that there is little time to gain a precise measure of impacts before both the technology and the milieu of use have been substantially transformed."[16]

In US universities, there are a few scattered courses and programs devoted to technology assessment, under the labels of future studies, policy studies, or science/technology/society studies. But, in general,

these academic havens are few in number, poorly developed, and low in prestige. Little wonder, then, that the notion of technology assessment was developed outside academia and established in the Office of Technology Assessment of the US Congress, where most TAs have been performed. (The other major home for TA is in the National Science Foundation.) But even the OTA is not entirely what it seems. Despite conducting many valuable studies on the consequences of various technologies, OTA has also, at least in recent years, conducted studies more accurately labelled as technology development and promotion.[17] And it must also be remembered that OTA is primarily concerned with conducting studies for the benefit of the US Congress, and not with promoting public education and participation in science policy. Such participation ought to be encouraged in a democracy, but has received little attention as part of civic education, which itself receives relatively little attention.[18]

In order to choose technologies wisely and to steer them toward the public good, we must understand the risks and benefits of tools that have been developed and are in the process of development.[19] Broadly considered, it does not appear that we have any adequate capability at the global level or within any nation — certainly the investment in technology assessment, broadly construed, is miniscule relative to the investment in technology development. It is not realistic, incidentally, to expect those self-interested persons who develop technologies to think about their consequences. Artists are not necessarily good critics, nor are critics necessarily good artists. Similarly, in technology, the criticism function should be cultivated as a separate entity, to mediate between creators and the public.

3) Uncritical Optimism and Pessimism About Technology is Widespread

Jones' Seventh Law states that "Every technological change has an equal capacity for the enhancement or degradation of the quality of life, depending on how it is used."[20] One might quibble with the notion of equal balancing of technological benefits and costs, but the essential wisdom that all — or at least most — technologies carry both positive and negative consequences would seem undeniable. It would therefore seem that citizens in a democracy, as well as their leaders, would embody this wisdom in their public decisions.

I suspect that this is not the case. Rather, I fear that naive technological optimism, and its counterpart of naive pessimism, are widespread. The extremism of Pollyanna and Cassandra is not only widespread among the public, but also among our presumably educated scientists, who tend toward uncautious optimism, and humanists, who tend toward reactionary pessimism (essentially, C.P.

Snow's two cultures, as isolated as ever). The gung-ho technocrats and the terrified nihilists reinforce each other; the former viewing the latter as ignorant Luddites, and the latter viewing the former as dehumanised and unethical. Those of a more moderate and balanced outlook, who would assess and shape emerging technologies rather than blindly promote or reject them, are caught in this crossfire.

I also suspect that the moderates — those who would subscribe to Jones' Seventh Law — are a minority, and that their quest to assess seriously the costs and benefits of technology is restricted by the technological extremists, especially the optimists who have an economic interest in the unfettered expansion of their specialities. Even among the general public, there is evidence to suggest a general disposition toward the positive aspects of human affairs in general and technology in particular, and toward repressing the negative in selection and perception (e.g., in considering technological risk).[21]

These speculations might be profitably explored in greater detail by the Commission. Indeed, a study of the general receptivity to the Commission's mission by both the public and by professionals — and the nature of the opposition — could be instrumental to fulfilling the mission of wakening sleepers.

4) Many Citizens Are Sleeping, and Only Some Can Be Wakened — With Greater Effort Than Anticipated

"Sleepers, Wake!" is a splendid rallying cry, used by Barry Jones in his book to draw attention to the new realities of information technology and the implications for work. But how many sleepers have been awakened by Jones' book or other means? What does it mean to be awake? And, in that the plethora of new technologies is constantly changing, and the glut of information is constantly growing, how can the newly-awakened be kept awake?

Jones has wisely acknowledged the problem faced by the Commision for the Future: a "very poorly informed constitutency" and "a lot of people who simply don't understand what is happening" — in short, "The sleepers are not waking as rapidly as one would like."[22] (I suspect, however, that the problem of civic somnolence may not be any greater in Australia than in the United States and elsewhere.) The "anti-intellectual cycle in Australia at the moment", identified by Jones in 1985, surely has had its discernible counterpart in the US over the past few years.[23]

The problem of wakening the sleepers is also known in more prosaic terms as adult education and as civic education. The Commission for the Future is essentially an exercise in adult education, "a consciousness raising exercise to teach the community there there are choices to be made about the future" as described by Jones.[24]

It is hoped that the Commission can make some effort to assess the magnitude of the educational problem and the efficacy of various measures taken to deal with it — measures to waken sleepers. Schools and colleges may very well be found to be a major part of the problem, not only for their lack of attention to teaching about technological change, but also because they may have conditioned many adults against staying awake, against lifelong learning.[25]

A recent inquiry in the US, the Commission on Higher Education and the Adult Learner, issued a brief report entitled *Adult Learner: Key to the Nation's Future.*[26] The American panel stressed that adult learning is no longer a luxury but a public necessity. Several learning tasks were identified: developing employability for the unemployed, maintaining and enhancing occupational skills, coping with functional illiteracy, and developing knowledgeable citizens in a technological information society. The Australian Commission, I am sure, will similarly find that adult learners are the key to the nation's future. Certainly, there is much to learn about our rapidly changing world.

NOTES AND REFERENCES

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4. About 400 abstracts of books and articles on communications technologies and their impacts are available in the six *Future Survey Annuals,* which bring together more than 7,000 abstracts in all, many on various technologies and their impacts. See Michael Marien (ed.), *Future Survey Annual 1985: A Guide to the Recent Literature of Trends, Forecasts, and Policy Proposals,* World Future Society 4916 St. Elmo Ave, Bethesda, Maryland, USA, January 1986; also five earlier annual compilations.
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8. The materials revolution is suggested by Christopher Flavin, *The Future of Synthetic Materials,* Worldwatch paper 36, Worldwatch Institute, Washington, 1980; 'Stretching materials to the limit', *Economist,* 17 May 1980, pp. 77-88;

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12. The Star Wars initiative of the Reagan Administration has generated an extensive pro and con literature. *Future Survey Annual 1985, op.cit.,* offers 33 abstracts on this hot topic.
13. Alexander King, 'Introduction' to Bettina Schmeikal *et al.,* (eds), *Impact of Technology on Society: A Documentation of Current Research,* Pergamon, Oxford, 1983.
14. E.E. David, Jr, 'Science, the greatest experiment', *Vital Speeches of the Day,* 51, 5, 1984, pp. 142-6.
15. James N. Danziger, 'Social science and the social impacts of computer technology', *Social Science Quarterly,* 66, 1, 1985, p. 17.
16. *ibid.,* p. 13.
17. Some recent examples of the US Office of Technology Assessment evolving into an 'Office of Technology Assessment, Development and Promotion' include *Wood Use: U.S. Competitiveness and Technology* (August 1983), *An Assessment of Maritime Trade and Technology* (October 1983), *Technology Innovation, and Regional Economic Development* (July 1984), *International Cooperation and Competition in Civilian Space Activities* (July 1984), and *Civilian Space Stations and the U.S. Future in Space* (November 1984).
18. James C. Peterson (ed.), *Citizen Participation in Science Policy,* University of Massachusetts Press, Amherst, 1984.
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21. Margaret Matlin and David Stang, *The Pollyanna Principle: Selectivity in Language, Memory, and Thought,* Schenkman Publishing Company, Cambridge, Mass., 1979. Also see Vincent T. Covello, 'The perception of technological risks: a literature review', *Technological Forecasting and Social Change,* 23, 4, 1983, pp. 285-97, who concludes that the need to reduce anxiety often leads to the denial that risk and uncertainty exists and that both experts and laypersons are typically overconfident about risk estimates.
22. 'An interview with Barry Jones', *Ascent,* 6, April 1985, p. 3.
23. *ibid.*
24. *ibid.,* p. 7.
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