Chapter Six

The Arts, Communications Technology and Interactive Multimedia

No aspect of change seems likely to have a greater effect on the way we lead our lives than the implementation of new communications technologies. They are in the process of up-ending the financial, political and cultural shape of the world. The changes already apparent - whether satellite transmission of television programs across oceans and national boundaries, the instantaneous movement of vast funds around the world, or immediate and direct computer access from any country to the catalogues and collections of the world's richest libraries - only presage even greater transformations over the next decade.

The communications networks of the future will offer all manner of new services, depending ultimately on the interests and needs discovered by consumers. In private life, one will be able to draw into one's home film and television fare, recordings, news, educational programs, shopping information, plane and train timetables, theatre programs and reviews. Medical diagnoses can be made from remote points, and medical records placed in databases and easily transferred. Government information can be available on computer screens. Business users could establish complex warehousing and ordering systems, customer charging and payment systems, electronic marketing, continuing financial market updates, all working instantaneously world-wide. Machines, factories, can be controlled from distant places. Such systems already exist.

Once again, complexity theory reminds us that at times of such rapid evolutionary change, there are special opportunities to influence events advantageously, and risks through inaction of languishing in an evolutionary cul-de-sac.

Official policies in Australia actively support Australian participation in this new world, especially in the production of entertainment, educational and informational program materials. Because there is potential for a new and very profitable industry, there is intense interest from private and government sectors. The arts community is a natural participant in these developments, and so finds itself in the unusual situation of potentially playing a central role in a major initiative with enthusiastic bureaucratic, political and business support.

The new communications regime will consume representations of traditional arts product, and engender new artistic forms. It could electronically import an audience for Australian arts from anywhere in the world. It also could change audience habits and taste and endanger the continuation of arts traditions surviving from centuries past. Extremely powerful evolutionary and financial resources will ensure the roll-out of the communications revolution. That the arts will be affected is beyond doubt; how they are affected might be influenced by our actions.

This chapter offers a basic understanding of the nature of the developments in communications technology, the present state of development in Australia and the policies proposed to ensure that Australia is a beneficiary, and not a victim, of these changes. The chapter is organised in the following sections.

Communications technology. As a preface to the discussion, the main technological concepts in communications delivery systems are explained

Telecommunications carriers in Australia, the emerging structure and ownership of the industry, and problems of convergence.

The strategy for network services proposed by BSEG, the main government advisory body, envisages a user-based, managed evolutionary approach to communications development.

Program content for the information highway. Priority will be given to the development of an Australian industry for the production of video and interactive multimedia content for the national and global market. This will bring an abundance of new opportunities for artists.

The implications for the arts of the development of the communications highway: wider dissemination of traditional and new art works, the creation of new art forms, and aid in arts administration.

Conclusion: the highway and planning for the arts, and the role of arts planning bodies.

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Communications technology

While the press is full of stories about the succession of power plays in the communications industry and, in the specialist sections for knowledgeable readers, accounts of the latest communications gee-whizzery, it cannot be assumed that the probable readership of this book understands the fundamentals. Without such an understanding, one could hardly begin to conceive the probabilities or possibilities for the future. Here is a brief exposition of fundamentals.

Digitisation

At the heart of the new world of communications is digitisation - the electronic coding of information as a pattern of ones and zeros, impulse/no-impulse, and its transmission through the air or by cable to a receiver which translates the code back into its original form. Anything which can be encoded in this way can be transmitted and then decoded and reconstituted to its original form by the receiver. Print is digitally encoded in a computer and can be sent to a remote computer by telephone line or other means. So also, static graphic images, moving images, voice, music. However faint the ones and zeros received, they can be restored by the receiving instrument and there is no loss of definition or detail in the transmission. Hi-fi in, hi-fi out.

Bandwidth as a limitation on digital transmission

So, in theory, an infinite amount of information can be made available and transmitted accurately and instantaneously between people at opposite ends of the world or in the same building. Cost aside, distance becomes irrelevant.

The limitations on such communications depend in part upon the capacity of the mode of transmission between sender and receiver - metaphorically, the diameter of the pipe. Optic fibre has a much greater capacity than copper wire, for instance. A print transmission can pass down a very narrow pipe; a moving picture with audio translates into much more digital information than does print, and so needs a wider pipe, i.e. a broader range of frequencies or *bandwidth*. The communications revolution arises in part from the imminent expansion of available bandwidth.

The following table shows the bandwidths required for various types of transmission. (*Pay TV Review 1995. 1st Edition*. James Capel Australia, Sydney, 1995.) It is easily apparent that the existing telephone system is inadequate for the transmission of moving images or high fidelity sound. According to CSIRO scientists, by the year 2020 we might expect to have optic fibre service into the

home carrying 155 Mbits of information per second. The present telephone system carries 64 kbits/second, 2,400 times less. No-one really knows the eventual bandwidth of our optic fibre network.

BANDWIDTH REQUIREMENTS

Content type	Quality	Bandwidth	Equivalent number of voice channels
Voice	Telephone network	4 kHz	1
Music	AM radio	9 kHz	2
Music	FM radio	15 kHz	4
Music	CD	200 kHz	50
Video	Broadcast TV	7 Mhz	1,750
Video	High definition TV	30 Mhz	7,500

Hertz (Hz): unit of frequency, one cycle/second. 1 kHz = 1,000 Hz. 1 MHz = 1 million Hz

Distributive and communicative systems

A *distributive system* is a system for one-way transmission of information, such as the free-to-air radio and television broadcast systems. The content comes from service providers. A *communicative system* is two-way, such as the telephone system, with content from users. There is a spectrum of admixtures of the two.

With *broadband(width)* transmission technologies, the carrying capacity of *distributive* systems is much expanded. So, for instance, Australian home television will soon be able to receive by Optus satellite up to 10 television channels. By cable, Optus will provide 64 channels and Telstra (Telecom) 200 channels, with hundreds more possible. New York residents already receive advertised programs over 50 channels by cable. (But "There's nothing on the television", they complain...) Hughes DirecTV in the USA is offering 100 channels using the same satellite equipment as Optus. "Wireless" transmission is satisfactory for distributive services, and since it is cheaper, faster to set up, and in some systems can reach populations distant or remote from high density metropolitan areas, it has some advantages over cable as a distributive system especially into the medium term. It is a problematic vehicle for broadband communicative services, although those problems may eventually be solved.

The telephone is a perfectly satisfactory *communicative* system, so far as it goes. However, in our present telephone system the copper wires which carry telephone signals are too narrow a "pipe" to accommodate the signal for FM or CD quality music in real time - i.e. the actual playing time. We have all experienced this informally from listening to music via telephone. Nor, similarly, can they carry in real time the more complex signals such as required by video. The information only trickles through. If a video signal is played in real time on a screen as it comes down the line, the image of a moving object jerks across the screen rather than flowing smoothly. For transmission of more complex material, and especially for a highly *interactive* service, broadband cable will be required.

Interactivity

Interactivity may be ultimately the most important advance offered by the new communications system. If the bandwidth is sufficient, then it is possible for the consumer in a communicative system to interact in a complex way with the source of transmission, for instance, by playing a computer game or utilising an

educational CD-ROM in real time with a computer at the other side of the world. The digital signal then is carrying a lot of information both to and from the consumer. Such *interactivity* requires a lot of transmission capacity and so depends upon a broadband carrier. It also requires "switching" so that any piece of the cable network is carrying so far as possible only the signals intended for the people connected to it, and is not flooded with signals from everyone everywhere. The engineering in a switched system is much more elaborate and costly than in a simple distributive system.

We already receive one-way complex audio-visual information through our free-to-air television sets, and can choose from among programs at the time of their scheduled broadcast, but cannot interact with the program provider to call specific programs up at a time of our choice. *High level interactivity* allows the viewer to interact with and control the program source - video-on-command, or at a still higher level, video games or interactive educational services for instance. *Low level interactivity* responds to but does not affect the program content - e.g. by sending an order direct to a supplier in response to a broadcast advertisement.

Alternatives in wireless technology

Our present free-to-air television and radio programs are mostly *terrestrial* transmissions - i.e. they are broadcast directly from a ground-based transmitter to the consumer. In recent times broadcasts have been sent from the ground to a *satellite* or system of satellites for transmission to consumers over a large geographical area. Consumers pick up the signal directly from the satellite through a receiving dish, either individually or by cable from a single large dish connected by cable to all the residences in a building or a small community. Television companies may pick up a satellite signal and retransmit it through the regular free to air broadcasts, the cable network or by MDS (see below).

A *satellite system* has some strong advantages as a distributive system. Because of the elevation of the satellite, it can directly reach all the population in a large geographical area except those for whom a line-of-sight is blocked by a hill or building or other obstruction. It is suited for delivery of signals to sparsely populated areas where cable delivery is uneconomic, and so may always be the dominant or only source of service in much of rural and outback Australia. It can bring a relatively quick financial return to investors, and on that acccount is more feasible financially.

Satellite has some limitations. The number of channels that can be broadcast is restricted compared to cable. Because a satellite is highly directional the consumer has to point the receiving dish precisely at the satellite; transmissions from other satellites could be received only with an expensive motorised dish or additional fixed dishes.

This difficulty in technology or cost probably will effectively limit competition from foreign satellites. Somehow, this does not seem to be much recognised in the discussions of potential foreign penetration and cultural domination via satellite broadcasts. Australia's Communications Futures Project lists fourteen foreign satellites that can be expected to transmit signals into most of Australia, and illustrates their footprints (10, Appendix II). But will any other than wealthy enthusiasts want to install the receiving dishes?

Prevailing opinion is that satellite will not be able to support centralised interactive services in the foreseeable future, except through use of a telephone line for the back channel. However, there is contention on this issue. An officer with a US satellite broadcaster which began service this year claims that the technology exists for full interaction. Nicholas Negroponte of the MIT Media Lab

disagrees; he claims it can have only limited bandwidth while fibre capacity is "infinite".

The *multipoint distribution system (MDS)* is a terrestrial microwave system suited for servicing local areas with flat terrain. The transmission radius is 50-60 kilometres. It is highly directional and there must be unobstructed radio line of sight between the transmitter and the receiving antenna. It would be a relatively good proposition in Melbourne and Adelaide and a poor one in half of Sydney. Microwave is the carrier, via repeater stations between Australian capital cities, for much networked television material.

The great advantage of MDS is its very low construction cost and low cost per subscriber. In 1992, a transmitter could be brought on air for about $500,000. Also, like any wireless system, it can connect with all prospective users in any area immediately it begins to transmit, so the financial return can be faster than for cable. In addition to the line of sight requirement, its disadvantages are that atmospheric conditions can interfere with reception and, compared with cable, it has a low number of channels and limited potential for interactivity. It is expected that it will have some success in the next five years, but that users will migrate to cable as more advanced cable services become available. (Ibid p.70)

Alternatives in cable technology

There are several types of cable in use. *Twisted copper wire pairs* are used in the customer access networks (CANs) of the telephone system, connecting individual customers to the exchange. They are satisfactory for ordinary telephony but offer only narrow bandwidth. *Coaxial cable* (coax) consists of an inner solid copper wire surrounded by a cylindrical plastic insulation which in turn is covered by a metal tube. Coax has broadband capabilities. *Fibre optic cable* is the cable of the future, used now for the main telephone trunk lines and generally down to the local exchange level. It has effectively unlimited bandwidth, is immune to electrical interference and has lower maintenance costs than copper. Optic fibre cable and installation costs are now competitive with copper, but the equipment required at each end of each fibre strand is expensive and so far precludes the use of fibre for the direct connections to customers.

Pending financial feasibility of full fibre networks, carrier companies are opting to replace or augment twisted pair CANs with coax, to make *hybrid fibre/coaxial* (HFC) networks.

The immediate advantage of cable technology comes with the existing telephone system, a communicative system reaching all Australian businesses and 95% of Australian homes. Although the narrowband twisted pair cable is extremely limited in its capability to meet future demands for multimedia transmission and high interactivity, even were experiments such as ADSL successful (see below), the telephone system adequately supports voice communications including conference calls, data services, and text and static graphics through fax, e-mail, Internet and so on.

The greater technical demands of interactive multimedia transmission will be met more satisfactorily by broadband cable than any other medium. It also promises almost unlimited channel capacity. Optic fibre has high resistance to interference from natural and electronic sources; coax has more resistance than twisted pair, due to its insulation. Cable is disadvantaged by the high cost and slow speed of construction, and in a country like Australia, the financial infeasibility of service to the population in remote areas.

ADSL (asymmetrical digital subscriber line) is an experimental technology which could bring some broadband capability to the existing telephone system. It

applies special equipment at the ends of the twisted copper pair cables so that they are capable of carrying "downstream" the telephone signal and up to three channels of video simultaneously, of reasonable quality for customers within 3 kilometres of the exchange. The upstream capability of the telephone system is also enhanced, so modest interactivity is possible. It would be capable of supporting video on demand, in which case the three-channel limitation fades in importance. The great advantage of ADSL is that it makes use of the existing telephone cables and switching system. Although it is not a true broadband service, it could be an interim solution. The disadvantage is that it is so far very expensive to install - about $30,000 per subscriber (Ibid, p.60). By the time these costs fall, HFC will be taking hold and the need for an interim solution will have passed.

ISDN (integrated services digital network), like ADSL, extracts higher capacity from the existing twisted pair telephone lines. It is already offered through Telecom, it can be installed relatively cheaply, and can support slow-scan or low-resolution video, adequate for instance for interactive home-shopping, some video games between remote players, and videophones. It could be in far wider use now were it not for Telecom's high charges, which some in the industry find inexplicable.

Compression

The carrying capacity of a transmission system required for delivery of various categories of information is being progressively increased by *compression* of the data, deleting aspects of the data which are peripheral or redundant. For instance, CD-quality audio produces data at 706 kilobits per second, but this can now be compressed to only 128kbps. Compression of video is even more spectacular - a reduction from 159Mbps to 6Mbps or less. (6) By 2010, the combination of such compression techniques and the further development of memory chips could see production of cards of about the size of a thick credit card, carrying several hours of compressed video. More pertinently to the present discussion, compression allows transmission of more information where bandwidth is limited.

Telecommunications carriers in Australia

Over the year since this chapter was first drafted, this section has been rewritten at least half a dozen times as various plans emerged, power plays succeeded or failed, alliances formed and shattered. On recent evidence, predictions three months ahead have only modest prospects of realisation. As to fifteen years ... To develop policy in this area must be a nightmare.

The beginnings of the new communications networks were confused by what, in hindsight, was government ineptitude to an unusual level. Fortunately, its management of the area seems to be increasingly skilled. A basic realisation was given voice by the Minister in his announcement of November 24, 1994: "Duplication of infrastructure, or the threat that it may develop, is essential for competition". (18) Benefits are expected to follow from such duplication, including lower prices to consumers and a more supportive context for the development of an Australian industry to produce video and interactive content for the networks, a government priority.

Satellite. Optus owns the satellites to be used for telecommunications and broadcasting services. It launched one in 1992 and another in 1994. Probably the 1992 satellite will be the instrument for pay TV. These Optus B satellites are in a stationary position relative to the earth, 35,900 kilometres above the equator, travelling, as a matter of interest, at 3 km per second. They have a useful life of up

to 18 years. The B series satellites can project seven different beam patterns or footprints onto the ground, the ground in this case covering Australia and New Zealand. They have fifteen transponders, devices that receive the signal, amplify it and then retransmit it back to earth. Each of the transponders at present can carry at least five channels of digitally compressed video. The beam from the Optus B satellite reaches earth with sufficient power to be picked up directly by homes via a relatively small and thus inexpensive receiving dish; this will be its great advantage in providing pay-TV service to remote areas.

Licenses have been sold by the government to Australis and Continental Century for each to use the Optus satellites to broadcast up to four pay TV channels. They have jointly leased two transponders on the B1 satellite. The ABC has been allocated two channels on this satellite. Australis may lease a further transponder to reach about 235,000 households not captured by its main high performance beam. Its signals will be picked up for further diffusion through cable and MDS.

MDS transmissions. MDS transmitters are also licensed by the government. 224 licences have been issued to date: up to 19 channels in each of 13 areas. Issue of licences for another 18 areas is planned for May/June 1995. Australis has won most of the licences so far: 209 are controlled by Australis or its franchisees. Nine are controlled by Optus Vision. The Aboriginal company in Central Australia, Imparja, controls a licence. A couple are given to tourism channels, one to racing.

Cable. The present telecommunications network is one of the more advanced in the world. 95% of homes have telephones, 51% of the lines are already digitised and about 50% of homes are within 700 metres of optic fibre. (In Chile, there is 100% digitisation.) It is also pertinent that more than 40% of Australian homes contain a personal computer - the highest penetration outside the United States.

Telecom has fibre optic cable on the main trunk routes and coaxial on lesser trunk routes, with fibre to almost all local exchanges. By the beginning of 1998, all metropolitan exchanges will be upgraded to support ISDN and two years later rural exchanges will have followed suit; this will allow a national ISDN communicative service. It is extending fibre to "fibre serving areas" of about 500 homes. Through its Visionstream subsidiary, in 1994 it began the laying of coaxial cable beyond the fibre serving areas to the kerb as an overlay on the existing twisted pair CAN. At the time of writing Telecom had just announced that its network will be totally digital.

Optus surprised the industry in September 1994 by announcing a new consortium, Optus Vision, that would lay out a cable network to carry both telephony and broadband services right to the home. Optus Vision's initial plan proposed to retain control over use of the network for all services except telephony, against a government policy for open access. The government refused to allow this. Optus then publicly cancelled the project. However, there was press speculation that the cancellation was only a ploy, because of the value to Optus in being able to offer local telephone calls. The government agreed finally that both networks could restrict access to the spectrum reserved for pay TV until June 30, 1997, in order to allow them to build income against their enormous capital investment. But open access provisions apply to broadband services immediately (if only there were any!) and to pay TV after that date. Optus discovered that it after all could find a way to lay the cable.

Open access by service providers to channels is a major policy issue, affecting Australia's ability to build an international content production industry. It will be discussed at greater length below.

If Optus Vision retains its plans for an initial analogue pay TV service, Optus cables will carry near enough to 460 MHz of bandwidth, with up to 64 video channels of 7 MHz. The digital Telecom cable could carry 400 or 500 channels. For Telecom, set top units will be digital from the outset, but for Optus they will be analogue, and will have to be replaced or modified in the future to receive digital transmissions. A phased introduction of digital is more likely than an abrupt change. While both cable networks will have sufficient bandwidth to accommodate interactivity, it is not certain that either initially will install the switching equipment to permit broadband communicative services; a major upgrade will be required later to achieve this.

For the networks the immediate incentive for the rollout of cable is the profit available through telephone services. Optus will *create* telephony profits by adding CANs and thus a local call service to its system, and will induce customers to join through its pay TV offer. Telecom will *protect* its telephone profits by adding a pay TV service to retain customers. In the longer term, both networks are positioning themselves for a supposed even richer future of broadband interactive services. However, while there is a degree of certainty about public interest in pay television, since it simply extends a service which already has almost universal acceptance, the public taste for interactive services is unknown.

It is said that other cable companies will enter the market in the future, with roll-outs likely to be confined to metropolitan areas, to fill ecological niches for services not offered on the main networks.

Convergence.

The digitisation of information has brought about a convergence between a number of previously independent industries of contrasting cultures: telecommunications, broadcasting and computing. Now the telephone company finds that it will be the means of transmission of television programs which previously were only broadcast via a wireless medium. At the same time, the development of the mobile telephone means that much of its previous cable-based business is moving into the air. Under Australian cross-media ownership regulations, newspapers are forbidden a controlling ownership in television stations. But newspapers are intending to publish on-line as well as - or perhaps eventually instead of - on paper, and so newspapers and television programs will both enter the home through the television screen - or the computer, previously standing lonely on the desk, but now talking to the world.

Cross-media ownership regulation begins to seem perverse. The crucial issue is to ensure that media ownership, or the provision of programming - a distinction which will be seen later to be important - is not in the hands of only a few players.

The Broadband Services Expert Group (*Networking Australia's Future, Interim Report*, 1994, pp. 5-8) notes that there are many other convergences fostered by these technological changes. The old gulf between science and the arts is breaking down, with digitisation enabling new ways of producing and communicating the traditional arts, and fostering the development of new arts genres. Vehicles for interactive multimedia (IMM) - notably at present the CD-ROM - can carry not only a sound recording of a great musical work, but also the notated score, visuals showing the historical context in which it was composed and moving images of excerpts from the performance, and an explanatory text: all with interactivity. Such interactive programs are now only available through immediate computer access, but soon they could be available on-line.

There is a convergence between the global and the local. David Worrall, head of the Australian Centre for Arts and Technology in Canberra, lives in that new

world. He communicates routinely over the global computer network with other artists/scientists around the world whose geographical location is irrelevant - even unknown. They - via their text messages - are to all intents and purposes there in his studio, on the computer screen. For David on-line, national boundaries have disappeared. Within Australia, the divergences between city and country will be ameliorated. The same rich mix of information and interactivity, whether for business activity, pre-school or adult education, social or political work, cultural consumption or creation, could be available to all but the more remote locations.

There is a convergence between the real and the imagined, as computers come to be able to present an artificial three-dimensional reality which is increasingly indistinguishable from the real thing (see next chapter), and a convergence between seeing and doing, as with interactivity the viewer becomes able to respond to and act upon the computer image. Education and entertainment become less distinguishable as computers allow the student to learn through play.

Homes, offices and schools converge. Much work and play could be done in any place that has an interactive on-line connection. Already many workers work on-line away from the office. Arthur Andersen, a management company, has reduced average office space per staff member in Sydney by about one third because so many work at home or on the road, maintaining contact on-line.

Program providers in Australia

Corporate structures and alliances are already forming in Australia around these convergences.

Telstra has alliances which demonstrate the convergence model already given: telecommunications, broadcasting, print and film media, and computing. For programming purposes, Telstra (an Australian telecommunications company) has set up a consortium with News Corporation (in Australia a newspaper publisher and internationally an owner of television networks, newspapers and a film studio) and Australis under the name Foxtel. Telstra and News have bought shares in Australis and Australis has the option to buy shares in Foxtel. Galaxy programs, offered direct from satellite and MDS, will now also be found on Telecom cable. Galaxy will have access to News Corp's Twentieth Century Fox film library and others to which it provides access, and Foxtel will have access to film available through Galaxy US contracts. It is worthy of note that Australis, comparatively a corporate pipsqueak, was able to swing this deal because of the leverage provided by valuable contracts Galaxy had signed with US film studios. Access to vast libraries of film product is a vital necessity for multi-channel pay television. Telstra has a joint venture, On Australia, with Bill Gates' Microsoft Corporation, the US software giant, to develop future operating software for its cable system.

Optus Vision has important contracts for film with US cable networks and studios - said to be ESPN and HBO, the latter including the giant Warner Bros and Disney studios. Kerry Packer's 5% stake in Optus Vision brings with it programming from the Nine network. The Seven network had a stake in Optus Vision, from which it has withdrawn. Currently it has no alliance with any carrier or service provider. However, News owns 15% of Seven, and there is pressure on Seven to throw its lot in with Foxtel. This could be important to Foxtel, because Seven is establishing studios for production of program material for pay television, and could help Foxtel meet the governments' Australian programming content requirements.

The Australian Broadcasting Corporation has formed a joint venture with Fairfax newspapers and the American cable network Cox Communications, named Australian Information Media (AIM). The ABC will hold 51% of shares and

control the operations. AIM will operate two channels - a 24 hour news channel and a children's and entertainment channel. Turner International (CNN) and the giant US entertainment supplier Viacom will take equity directly in the two channels. Unlike the other two consortia, AIM is not involved in telecommunications hardware. For purposes of pay services, it is only a content producer and provider. AIM is negotiating to make its programs available through all available platforms - Galaxy satellite and MDS, and Foxtel and Optus Vision cable.

And that is the news as of March 17, 1995. Unimaginable change could occur by the time you read this book.

Roll-out

Because MDS is cheap and relatively simple to roll-out, and the initial cost to subscribers is relatively low, it is anticipated that of the three delivery platforms - MDS, satellite and cable - it will build a subscriber base the most rapidly, its subscriber base will be the largest until late 1999, and will continue to grow until 2000. However, it is predicted that from then on it will lose subscribers to cable and have a slowly declining base.

Satellite services also can be implemented relatively quickly and cheaply. However, because the government requires compressed digital technology to be used for satellite broadcasts, there will be difficulties in supply of set top units which may not be resolved until 1996. Therefore, there probably will be a minor roll-out in 1995, accelerating from 1996, and then tapering as cable services become available. Satellite will continue slowly to grow because it will be the dominant or only source of service to rural and remote areas.

Visionstream has begun to lay cable; Optus Vision has not. Visionstream will pass by 4 million of Australia's 6 million households by 1999, Optus 3.4 million by 1998.

Depending upon the way services and demand develop, eventually we may see an all-fibre network. According to Frater and Elsum, this is unlikely in Australia until 2010 to 2015 when the installation and equipment costs have dropped much lower. (15, p.7) But how then is it possible in the US by 1998?

Broadband Services Expert Group (BSEG) expects that digital services with higher interactivity - video-on-demand with any program available at any time - should begin by 1996. Switched broadband interactive services should appear beginning in 1998, allowing two-way transmission of high data rates. All services - telephone, video etc - would be carried on one line to a "smart set top box", there to be sorted to the appropriate receiving devices. (6)

The James Capel report offers projections of the subscriber base to the year 2004. By then, it foresees that 34.3% of housholds with colour television sets will subscribe to pay TV. Of these, 21% will subscribe to MDS, 21% to satellite, and 58% to cable. The total revenue generated in 2004 from subscriber tariffs alone will be somewhere around $1.4 billion. (28)

Overseas comparisons

In the US, where pay TV has been available since the 1970s, 74% of the 89% of households passed by cable are subscribers. There is an overall cable penetration of about 63% of households. About 30% of TV viewing hours are for pay TV. The US cable networks should be virtually totally rebuilt in fibre optic cable by the end of 1998.

In the UK, where pay TV services started in 1989, there is now a 22% penetration. Cable is predicted to overtake satellite in 1998, and by 2002, total pay

penetration is expected to rise to around 47%. In France, cable roll-out has been lethargic. About 50% of homes should be passed by 2002, but penetration of homes passed in 1993 was only 23.6%. (28)

On these precedents, expectations of Australian utilisation of network services therefore seem reasonable, the moreso considering Australians' high adoption rates to date for computers and the various means of electronic communications and entertainment.

BSEG's national strategy for network services

The Commonwealth Government has plenty of advice in the telecommunications area, some of which it has invited. The source to which the Prime Minister seems especially attuned is the Broadband Services Expert Group, created to advise on the big issues in communications development. It has produced two reports, titled *Networking Australia's Future.* The final and most recent was presented to the Government in December 1994 and launched publicly in March 1995. By that time the Government apparently had already accepted its recommendations, and Prime Minister Keating in launching the report said: "... I want to implement the BSEG recommendations as quickly as possible". There is reason, then, to pay special attention to the BSEG view of the future.

In its Interim Report, BSEG proposed the basis of a communications policy.

"The Group believes that the Australian vision for broadband services must be based on a number of key principles:

- it must be based on our tradition of inclusiveness, and avoid creating of adding to inequalities. To do this, we need to ensure there is wide consultation with the community in planning broadband services;
- access to the network should be open to content providers regardless of size;
- broadband services should reinforce our cultural identity;
- broadband services should contribute to the economic and social well-being of the community;
- private investment and competition should be promoted wherever appropriate;
- we need to promote involvement of Australian industry in developing leading-edge applications and content, in building and running broadband services networks, with carriers working in partnership with industry;
- government should actively encourage the development of broadband services and become a 'leading-edge' user; and
- we need a flexible regulatory framework which supports openness of access and keeps pace with change (6, p.10).

It is heartening that this influential group, broadly representative of government, industry and the academy, proposes at this crucial time a vision which incorporates with the thrust for economic development, a social conscience and an assured expression of our culture.

In its final report, BSEG proposes a "managed evolutionary" approach to planning development in electronic communications.(7) This has a special interest now for readers of this book, given the inferences drawn from the theory of complex adaptive systems. In a way, the BSEG approach is a version of the Dandenongs model, writ large, although it is not clear that BSEG's rationale is built on anything like the complex adaptive systems model.

The evolutionary approach is explained by the current predicament: development is proceeding at full pace in a situation where much of the technology has yet to be developed and little about the human reaction to it is yet known.

Which services the public will choose and which it will reject can be anticipated to a degree for pay television, because of local free to air experience and overseas patterns for pay services - but the public taste for interactive services is guesswork. It would be foolish at this juncture to take too prescriptive approach which risks locking us into dysfunctional or inappropriate systems.

The evolutionary approach should nevertheless be managed in order to achieve certain outcomes, for instance universal "reach" and the development of Australian hardware and content industries. And of course, developments will take place in a regulatory environment intended to produce various outcomes. So the development will be primarily bottom-up with some top-down nudging.

BSEG's strategy is not concerned just with building the industry and its infrastructure. It sees the objectives in much wider terms: to "build a platform that will underpin our future society - promote social interaction, enrich education, improve health services, enhance delivery of government services and improve competitiveness for businesses and the economy". In pursuing these objectives, Australia can also pre-empt some threats: of being left behind other countries in the race to take advantage of new communications technologies, of becoming consumers of other countries' content, culture and technologies, and of creating by default a class of 'information poor' people who are unable to use the technologies and so fall into a new category of disadvantaged, a new poverty trap.

BSEG believes that the approach should not be technology-driven. Development strategy should be user-orientated and demand-driven, both because this is an appropriate priority in terms of the BSEG philosophy and because in the event it is the users who will determine the nature and success of the networks and their contents and services. Consequently, and because of the potentially profound impact of broadband services, there should be a high level of consultation between government, all sectors of the industry, and the consumers.

In opting for an evolutionary strategy, it should be recognised that the evolution has already underway with the existing narrowband services; expansion of ISDN services might be completed across the entire Telstra network over the next five years. Narrowband voice communications, electronic mail, business services and access to data bases will not necessarily be supplanted by the later development of broadband for high data rate services such as video and high interactivity. However, it also can be expected that some narrowband services will evolve to broadband.

All reports to the government have emphasised the importance of the development of an Australian content-production industry to protect the viability of a distinguishable Australian culture, create skills, employment and wealth and provide a vehicle for import substitution and export earnings. The Government's cultural strategy document, *Creative Nation* (13, 1994), was devoted especially to fostering a content industry, and substantial funding was provided to accelerate the development of interactive multimedia and television productions. Since this is epecially pertinent to arts planning, it will be taken up later in the chapter.

Access for all the people?

The cost projection for the cable rollout planned to the end of the century varies from source to source, but $12 billion seems a popular figure. This takes cable past the two thirds of the population located in the larger cities and towns. As noted, the estimated cost for connecting every Australian home to a broadband cable system lies between $25 billion and $40 billion, a prodigious amount. Obviously the cost per connection increases with the distance from the high density population areas. Assuming that access to these systems becomes as

important to the individual's vocational, educational, cultural and social viability as their proponents claim, it is extremely important that all citizens should have access. To fail to provide this access is to exacerbate the existing trend towards a greater gulf between rich and poor. But the cost to connect distant or isolated people seems prohibitive - even though they may have the most to gain. Also, ensuring access for people of limited means presents financial problems.

US Vice-President Al Gore very early in the life of the present US administration proposed that governments must adopt policies to ensure that all citizens have a connection. BSEG has now confirmed this as one of the most important policy issues for Australia and the Prime Minister has referred to it specifically in his public statements.

In its Interim Report, BSEG suggested some possible government initiatives to facilitate cable provision to 'low density zones'. Alternatives include awarding licences conditional upon such service provision, cross-subsidisation, and government subsidy. It does point out that obliging private companies to supply these relatively high cost services could result in higher consumer charges or reduced service. There is also an important competing interest in laying cable internationally, which will be taken up later in the chapter. Both interests are of importance to the arts sector, which clearly should advocate appropriate government intervention.

Another sort of precedent has been set by the French government in the mid-80s as a method of putting France into a leading position in the new communications age. It directed the state-owned telephone company to provide free "Minitel" computer terminals upon request. There are now 6 million Minitel terminals providing text-based service, used regularly by around 40% of the population. The text-based Minitel terminals are cheap and a similar provision here for those of limited financial means might be good policy.

BSEG seems finally to have concluded that while there is a good prospect of very wide provision of ISDN narrowband digital services via the existing twisted pair CANs, it is not realistic to expect broadband cable to extend to rural and remote households. Even via satellite, some 15% of homes will not receive distributive services, although this is in part not a limitation of the satellite but a result of decisions by broadcasters about where to direct their beams.

It therefore proposes that the concept of "universal reach" should be substituted for "universal access". To provide services for those people who cannot afford their own facilities or who live outside the reach of cable, broadband facilities should be taken to public institutions including schools, public libraries, medical centres and community access facilities. BSEG proposes that access should be provided to all such centres by 2001.

One of the big question marks over the development of interactive services is the level of public acceptance and utilisation. While they will bring enormous economies of operation to business and public enterprises and therefore force the acquisition of skills by employees, there must be concern that the population at large gains the basic competencies. BSEG sees the need to develop a "culture of innovation" with wide use of strategies to prepare ourselves for change. Fundamental to this is the need for a national strategy for broadband networking in education, with immediate development of pilot projects. Training programs in the use of broadband techniques should be universally available at educational institutions, community centres, libraries and telecentres. To bring these opportunities right into the heart of the community, a fund should be established to

support innovative applications of communications services such as bulletin boards or information about local services or employment opportunities.

Given that the cable network will be a means of delivering the arts, the issue of universal access for users must be important to arts policy bodies. Also, if user access problems are not solved more generally, arts funding bodies may well find themselves at the sharp end of demands for provision of hardware and cable access, especially since arts funding is so skewed in favour of the large cities.

Open access to the cable system for service providers?

The issue of open access to cable for service providers is also of vital interest to arts policy bodies, given the prospect of the development of a content production industry, and the rich opportunities for the dissemination of arts programming to special interest audiences.

BSEG argues that the cable system should be open in a non-discriminatory way to all those who wish to provide services through it. The Government has adopted this principle, and as noted, has required both Telstra and Optus to allow open access to service providers from July 1, 1997. Given that billions of dollars of investment were at stake, there must have been robust pressure on the Government drop this requirement, but it seems that in the interests of the larger game it did not.

This access issue is a matter of anxiety in other countries. In the USA, John Browning (8) elaborates concerns that carriers will constrict access. He acknowledges that only very large companies will have the resources to finance information networks, but sees the concomitant risk "that instead of information highways, America will get information railroads run by information robber barons." Their power must be ameliorated by regulation. "The thankless job of regulators is to broker compromises that combine most of the benefits of big firms with as few as possible of the costs." In particular, the co-ownership of cable networks by communications and entertainment companies could lead to a situation where "The ability to use control of popular entertainment to gain clout in distribution - which in turn can be used to sign up exclusive rights to more popular entertainers - ... could kill any competitor without access to endless supplies of *I Love Lucy* and *The Wheel of Fortune*". The US Council on Foundations was worried enough about the issue to appoint a special panel, which reported in May 1994 that for the most part, the priorities of the corporations controlling the cables for "innovative and stimulating content that would create new high quality models for learning were peripheral to the corporate agenda". (31, p.25)

Discussing the situation in Britain, Barry Cox in *The Guardian* invites us to "imagine a giant company that runs bus and trucking services being allowed to finance the building of a country's only motorway network. In return it has a monopoly on charging the tolls on these motorways. It could then allow its trucks and buses to travel free and charge its rivals whatever it likes, free from any regulatory oversight. On top of that, it demands, and gets, access to its rivals' customer data bases as part of the deal to let them use the motorways. If you don't agree, you don't use the motorways. Not bad, huh? That is roughly what [Rupert Murdoch's] BSkyB are already doing on the electronic equivalent of the M1, and would like to carry on doing as digital TV is developed over the next 10 years."

It is refreshing to see Philip Lind, Vice-Chairman of Rogers Communications, which is merging with the giant Maclean Hunter corporation to construct a Canadian cable network, publicly state the view that "the Information Highway must be introduced with policies designed to maximise the benefits for Canadian

consumers and Canadian culture" (31, p.47). Has there been a comparable statement from any Australian corporation?

The James Capel report concludes that open access rules will be redundant if there is more than one carrier network, since they will compete for quality programming, and will welcome content providers rather than risk losing them to the competition. (One could add the qualification that the networks would not be interested in quality per se so much as in the size of the audience drawn to the network.) Capel recounts the results of a case study by McKinsey and Company of interactive games in the USA. It "revealed that content providers benefit from the presence of alternative distribution mechanisms. While there was only one cable network, the content provider received 40% of the profits whilst the carrier kept. 60%. However, in areas where there was a second carrier, the content provider received a massive 90% of the profits". (28, p.37) It is in the public interest in Australia that the Optus system succeeds.

The Cutler report asserts that the success of Australia's development as a producer of interactive multimedia content will depend on direct and inexpensive access of service providers and their customers to international cable of adequate bandwidth. At present we have very modest fibre optic cabling to North America and to Asia via Hawaii, each rated at 560 Mbps. In addition, Telstra and Optus have decided to lay 5 Gbps cable to the Singapore and the nine-nation APCN system in East Asia. However, Cutler suggests that cables of 100 times present capacity may be necessary - and there so far are no plans announced for development on this scale (although it is possible that the need might be covered by more compression rather than more cables). Cutler believes that government must take a role in encouraging the carriers to lay out these international linkages. (14, pp.33-4), and to intervene to lower tariffs, now artificially high due to limitations on capacity and the operation of cartels.

Beyond the issue of access is the possibility of content requirements. It is argued by some in the industry that it is inappropriate or impossible to mandate local content on a video-on-demand service. Of course, the consumers cannot be obligated to choose Australian video in preference to foreign video. However, service providers can be required to include at least a specified minimum percentage of Australian titles in their program offerings, or, as is the case by new Government regulation in Australia, spend a percentage (10% here) of the budget for purchase of drama content on new Australian production.

The risk of exclusion of arts programming

The Australian commercial free-to-air television companies could have considerable influence on cable programming. In their regular operations they have demonstrated no interest whatever in arts audiences. As noted previously, ABA figures for 1990-92 show that the commercial television stations collectively over two years broadcast *zero* hours of Australian arts programming.

The fact that more channels are available is no guarantee that these programming policies would broaden. There are about 25 commercial radio stations in Sydney. None of them is devoted to classical music, or jazz or folk music. How many channels are needed before the exploration of niche markets begins? Arts policy and advocacy bodies would be advised to take a position which ensures the possibilities for other content and service providers to offer programming for minority interests.

West Australian media owner Kerry Stokes argues that there should be a "reserved capacity" for "small and specialist service providers in accordance with

general public need and interest principles". (25) He believes that Government intervention is needed to ensure such access.

In the US bill for the regulation of communications, provision had been made upon the urging of the non-profit sector for the reservation of bandwidth for the arts and other parts of the sector. 20% had been requested; 5% was proposed in the bill. There are two important *prima facie* implications here. The first is that the non-profit sector has reasons to believe the only way it will be able to gain access is through legislative provision. Secondly, the framers of the bill, having accepted the non-profits' case and implicitly thereby a premise of scarcity of bandwidth, were under such pressure from the commercial sector that they would only reserve 5% of the available bandwidth. The very number, 5%, gives *de facto* support to the non-profits' case.

In the USA these issues have led to the formation of the Telecommunications Policy Roundtable, which meets monthly in Washington to monitor developments in communications and related legislation and decide the role of the non-profit sector. In Australia, the communications industry sectors and their associations are very active in pursuing their interests in the formulation of the regulatory regime for communications, but one is not aware of any comparable scrutiny or lobbying from the arts sector, a potential beneficiary, or victim, of developments. Perhaps the Australian context is more benign, but it might be foolish to take this on trust. It would be prudent to undertake some investigation.

Summary: open access for service providers

In brief summary of the situation of open access for service providers in Australia:

- open access is guaranteed now for broadband service providers, but it may be a few years before switched broadband cables are available

- cable operators will be required to offer open access for pay TV services, but not until July 1 1997, with a possible further two year extension if the Minister is satisfied that sufficient (however that might be defined) competition exists

- there is effectively no open access at present to pay TV channels

- with 400 channels available on Telecom cable, it may not wish to avail itself of the moratorium on open access

- while it is difficult to see how an eventual 800 - 1,000 video channels will be utilised, and therefore why there should be a problem of channel provision for minority interests, the situation in the USA suggests that arts planners should seek to ensure such provision; a special task force might be advisable.

The development of an Australian communications industry

For the sake of completeness we give a brief account of BSEG's broader prescriptions for industry development. BSEG proposes a coordinated approach to fostering content, services and applications, and communications networks. We should balance the development of intrastructure and development of services. Obviously, neither a network without content or content without a network are much use to anyone. To this end, BSEG would require all cable network operators in broadband service provision to implement industry development plans. It proposes ways to accelerate development, demonstration and use of networked services and applications, including the initiation of pilot projects not only for the benefit of cable and service providers, but also the potential users.

It describes opportunities for manufacturers of hardware and construction companies. Australia is already a substantial manufacturer of cable and telecommunications equipment with a growing export trade. These achievements can be expanded.

Concerning content development, the Government has already taken a number of steps under its *Creative Nation* cultural strategy, and allocated $84 million over four years to accelerate the growth of interactive multimedia production. Specifically, it has created a source of investment funding in the $45 million Australian Multimedia Enterprise, mounted Multimedia Forums around the country to provide orientation to those interested in the opportunities, is funding Cooperative Multimedia Centres in which educational institutions and private multimedia firms will collaborate in educational and production programs, and is funding the production of ten CD-ROMS on significant aspects of Australia and Australian culture, to be provided to schools around the country.

BSEG says that there is a need for an integrated export strategy for content, hardware, and services. There would be great advantage and little disadvantage in "pre-competitive" cooperation within and between these sectors to gain exports.

The role of government

Essentially, government has three roles to play. It must set and inform the policy and regulatory environment to guide and support the development of the industry and ensure desirable social outcomes. It can encourage specific developments through the investment or granting of funds to businesses, individuals, and government bodies. It can be a leading-edge user of communications services.

Regarding its first role, BSEG has proposed and the Government has accepted that it should establish a National Information Services Council, chaired by the Prime Minister, and bringing together industry carriers, service providers, consumers and researchers. It seems appropriate that the arts industry should seek representation on this body. BSEG has also proposed the formation of a Ministerial Committe on National Information Services, to include all relevant federal Ministers. Finally, it proposes establishment of a Broadband Standards Advisory Group, chaired by industry.

Government regulation includes matters such as the issuing of licences and determination of the conditions under which they operate, matters of access and so on. BSEG proposes that once interactive services develop, "the communications regulatory regime should promote open and equitable access arrangements for users, service providers and broadband carriers.... This should be based on diverse and flexible pricing arrangements, pricing transparency in the provision of carriage and content, and commercially negotiated connection charges"

If only by the sheer scale of Government activities, it has a very important role as a leading-edge user of communications services. By itself using these services to provide information about government and opportunities for citizens and businesses, it can encourage the spread of services and help to create a market for local companies. It can participate in pilot projects such as those put forward by Telstra. It can fund Commonwealth research, for instance into the needs of particular groups of telecommunications users that are not currently being met.

Program content for the information highway

The development of an Australian interactive multimedia content industry

The new communications industry finds its greatest relevance to arts and arts planning in the potential for the production of CD-ROMS and their successor

interactive multimedia products. From amidst the welter of commercial and policy developments in the communications industry has emerged a very interesting report of particular relevance: *Commerce in Content. Building Australia's International Future in Interactive Multimedia Markets.* This report was prepared by Cutler and Company for the Department of Industry, Science and Technology, CSIRO and the Broadband Services Expert Group, September 1994. Its analysis and recommendations already have inspired new government communications policies in the Prime Minister's cultural strategy statement, *Creative Nation* (13). A fuller understanding of some of the reasoning of the Cutler Report should assist in a wider consideration of the possibilities in this area.

Cutler's fundamental proposition is that *"Australia as a small developed country is unlikely to succeed in global hardware games in telecommunications and information technology, but can address the growth options of the twenty-first century in service and "knowledge-based" industries. It is possible for Australia to become a major information and publishing location for the world through the nurturing of content industries."* (Ibid. p.1)

There is a key distinction to be made in the communications industry between 1) the communications infrastructure which has been the focus of this chapter so far: i.e. the wired and wireless carriers of information, and the infrastructure which encodes information digitally so that it is in a form which can be transmitted over these carriers - and 2) the creators of the content such as authors, art directors, producers, and the users who will interact with their product; (the "content industries" in the previous paragraph are not merely cheerful).

Australia's existential choice is to be mainly a small consumer of imported multimedia products, or a relatively major producer of these products for international consumption. Cutler, of course, proposes the latter. The report suggests that Australia should claim a "first-mover advantage" (i.e. "lock-in" in complexity theory) available to it for the next two or three years with a two-prong strategy: create a supportive environment to attract and retain activity in content production, and remove distribution bottlenecks as obstacles to international distribution of this product. The latter will be explained shortly.

The current state of the Australian IMM industry

There already are content industries in Australia relevant to interactive multimedia (IMM) production. These include consumer directories such as the Yellow Pages, newspapers and magazines, packaged software, computer games - and various aspects of the arts. The annual turnover is considerable - $9 billion in all - although the arts as captured in a tangible medium (recording, books, films etc) account for only $2 billion of this. The current value of IMM production is only $50-60 million.

Who are the Australian IMM content producers and what are their capabilities? In 1994, there were about 30 firms or project teams in Australia involved in IMM production. There has been explosive growth, and a year later there may be many more. Among these firms are established print, software, audio and film producers. Other such firms are involved only on the financing or distribution side. The implication from the Cutler document is that while there is considerable talent and enterprise among these teams, many are stronger in creation than in business and may not have a long-term future. Others combine and balance the necessary creative, technical and business skills.

This is important to note for arts planning purposes. Both the production and the marketing process are complex and financial viability or success will depend upon more than great artistry.The extremely artist-centred decisions of parts of the

Australia Council in recent years could be naively inadequate in recognising the organisational requirements of these new forms.

Despite its small number of IMM publishing firms, within Asia Australia has more such companies that any other country except Japan. It has more than all but five of 19 European countries (UK, France, Germany, Italy). The fifth, the Netherlands (53 companies), has a population size comparable to that of Australia, is comfortable with the English language, and has always invested very progressively in the arts. It could be worth checking as a model. The USA dwarfs all other contenders with 554 companies, almost as many as all of Europe (611).

Cutler believes that Australia has a strong position in the Asia-Pacific region, arising from the number of active content producers and a probable ability to rapidly increase that number; the relatively high CD-ROM consumer penetration in Australia (Australia has about 40% of the CD-ROM players in Asia outside Japan), providing an immediate domestic market sufficient at least to allow experimentation by content producers; and the agencies and distribution networks being built in Asia by some Australian media firms while the large corporations are preoccupied in building on their home territories in Europe and North America. This latter development obviously will give Australia a first-mover advantage, but Cutler does not explain how the present Asia-Pacific advantage in content production will be important, given the production strength of the large competing English-speaking nations and the emergence of borderless markets.

Australia could produce 2,500 CD-ROM titles a year, or about 5% of the projected future global production, says Cutler. An interesting, if daunting, target.

The medium-term prospects for the CD-ROM format

Australian IMM production at the moment is mainly directed to education and training, corporate communications and information kiosks, and is usually designed on contract for an end-user - e.g. a corporation, a TAFE system. It is Cutler's belief that this current mode of customised production is likely to become economically unviable with the development of a large consumer CD-ROM market, although there are those in the industry who dispute this. There is only a small production of CD-ROMS in Australia for the retail market, but it is expected that a major development of this market is imminent and that the CD-ROM will quickly become the dominant IMM format.

Indeed, whatever the future of on-line IMM, statistics seem to assure the short to medium term fortunes of the CD-ROM. The number of CD-ROM players installed is at present doubling every year, and by 1996 will number 45 million world-wide. This growth is at a rate faster than that for VCRs at a similar phase in their introduction. In 1996 Australia will have about 30% of the total installed CD-ROM players outside the EU and the USA, with a total of 1.8 million machines by 1998. Two thirds are found in homes, one third in workplaces. 90% of the personal computers sold now in the USA for home use include a CD-ROM player.(14)

The content of CD-ROMS covers an enormous range of categories - from biomedicine to military information and weapons to banking to advertising design and marketing and so on. Allowing for the arbitrariness of any categorisation, CD-ROMS for leisure and entertainment accounted for 19% of new titles in 1994, making it the largest category. It grew faster than most of the professional categories, indicating probably the increasing sale of CD-ROM players to homes. The arts and humanities category was in second place with 13.2% of all titles and an annual growth rate of 62%. (In 1993-4 a total of 5,379 titles were issued, 724 in

the arts and humanities. Growth rates in 1993-4 ranged from 74% down to 9%, with an average of about 50%.)

From its research, Cutler and Co. believes it is feasible that world-wide CD-ROM production could reach 100,000 titles per year by 1998. This would almost equal the production of music CD titles. Given the established base of music CD players, the long history of the music recording industry and the familiarity of its customer base with the product, the retail infrastructure, the support from broadcast media, the higher skill and more active role required of the CD-ROM user as compared with the music CD listener, and the higher cost of CD-ROMs compared with music CDs, this figure might warrant further justification.

The report draws an analogy with book publishing and recorded music production. In both recording and publishing the dominant commercial challenge is not so much production as distribution: simply to get product into the shops. Of the 10,000 new record titles issued each month, 1,000 are released by the six major multinational companies. But despite the massive marketing clout of the majors, only 150 of those discs will reach the shelves in ordinary retail stores! Very few of the 9,000 discs issued monthly by the independents get to those stores at all. Of course, if there were no sales for these 9,000 per month, production would quickly diminish; obviously a sufficient number break even or make a profit within their narrower market.

Cutler estimates that the 20 major international CD-ROM production firms will release 250 titles each in 1995, for a total of 5,000 titles. If there indeed will be a distribution problem for CD-ROMs comparable to that for recordings, how will Australian producers get their products into the international marketplace? Cutler thinks that with CD-ROM production budgets rising to and beyond the million dollar mark, they must do so in order to achieve financial viability. The strategy must be to achieve backing by international firms (e.g. Warner, Microsoft, Broderbund) so that Australian projects are among their 5,000 titles. Otherwise they will be among the 95,000 independent projects which may not recover costs.

Cutler seems to envision an Australian CD-ROM industry comparable to the popular music industry i.e. with popular product aimed at a global mass market. This is a natural enough objective from the business point of view. From an arts planning perspective, it would form only a part of the desirable activity - perhaps even the least interesting part. This may be the major point for caution in the Cutler study. Of perhaps more than anecdotal interest, I have learned of the rather terse rejection by an American multinational recording company of a very interesting and well-researched project advanced by an Australian artist with George Gershwin's *Porgy and Bess* as its subject. Could even *Porgy* be too esoteric for the mass CD-ROM market the company envisages?

Given the emphasis in the Cutler report on interactive multimedia, especially as embodied in the CD-ROM, it might be noted that the development of the communications highway does not depend upon success or utilisation of the CD-ROM format, or vice-versa. There is a lot of optimistic speculation about the future of the CD-ROM that assumes that a mass audience will abandon its accustomed passivity to enter into an active, intelligent relationship with a mode of entertainment. The introduction of cable TV in the USA has brought about a loss of audience share for the three free-to-air networks, from 90% down to 60%. But in 1993 the downward slide reversed itself a little. "There is a mass of people in America, 60%, who want to come home, sit on the couch, turn on the television, and be presented with something that they are likely to enjoy." (Stephen Stohn, 12, p.29). The point is that this massive audience is not even interested in dealing with

a menu of 50 or so channels to choose its passive entertainment. Three is enough. What then will be its taste for interactive entertainment? The success of shoot-em-up video games might hearten the optimists, although that type of interactivity covers a pretty narrow spectrum of intellect.

Before the broadband networks are operational, the retail market for CD-ROMs should give some indication of the potential on-line market for highly interactive products. If it is not a mass market, the highway could develop mostly by transmission of less interactive material, mainly for passive entertainment or shopping, and the CD-ROM might build a smaller success in the software stores or for educational purposes. Perhaps the special utility of the CD-ROM in the present Australian debate is that it locates a form of interactive multimedia in a tangible object, similar to others we have produced, used and sold, and which can be the focus of our attention. It is easy to conceive of supporting its production. But it is not the only way to go.

The CD-ROM format itself has limitations of storage and speed, as is apparent to any user. It can carry an enormous amount of text, but is quickly filled by (high fidelity) moving image and audio. This is why, for instance, moving image sequences are characteristically limited to a very small part of the screen. These problems will be ameliorated with further technological developments of the kind anticipated by Frater and Elsum (3a). But its further limitation is that it makes information accessible and searchable but not manipulable. Canadian musician and composer Michael Century calls this "point and click pseudo-interactivity". "What really promises new experience, which could enrich the arts for millions, is interactivity that gives the viewer or user an opportunity to actually play with the materials, to manipulate, build, control themselves. Not just hearing a piece of music and being at the same time able to see the musical notation or program notes, but to be able to conduct the orchestra, balance the instruments, and save the interpretations for comparison with others". This is not to make of us professional artists; "more important is the way in which our senses become educated, refined, tuned by direct involvement..." (31, p.51)

IMM on-line: the further challenges and opportunities for an Australian industry

IMM titles will be delivered via the object, the CD-ROM, in the next few years. However, as the decade progresses, the new broadband cable networks will reach more and more consumers and in due course IMM titles will be available on-line. Presumably the CD-ROM, or a disc or card of much higher capacity, will continue to be available but may gradually be supplanted by the convenience, low cost, and enormous catalogue of on-line titles. These may well be held in some other format than CD-ROM because of its storage and speed limitations.

When IMM product is available on-line, the challenge for distribution of Australian IMM product then changes. CD-ROM titles had to find shelf-space internationally, probably through adoption by multinational producers and distributors. But with on-line distribution, Australian IMM titles could be accessed directly by consumers from anywhere in the world. How can easy access at internationally competitive prices be assured? How can Australia establish a competitive position in the era of on-line delivery?

The fundamental concept advanced by Cutler is that Australia must import consumers - millions of them - rather than export IMM objects. This must be handled in such a way as to circumvent the cable equivalent of the distribution oligopolies for records and CD-ROMS, viz. prospective distribution bottleneck rents from local or overseas service providers.

To make this possible, cable providers from mid-1997 must offer *"competitive delivery of adequate bandwidth priced for the consumer pocket, offering near universal access, and dimensioned to ensure no congestion. Price competitiveness will need to be assured by making every element of the carrier service fully contestable, so that the consumer will not face rents that are based essentially on oligopoly rents and justified on the grounds of channel scarcity"* (Ibid p.30)

Nothing is possible if the cable capacity is not in place. The presently available bandwidth from Australia to North America, Europe and Asia needs to be expanded as rapidly as possible to perhaps one hundred times its present capacity. This may need some persuasion from government to Optus and Telstra, or to others if they do not rise to the occasion. There may be a trade-off, says Cutler, in a less universal cable provision in Australia: a solution that would raise serious objections from other quarters.

Given the scale of expansion proposed here, the Government's clearly stated commitment to development of the content industry, the contentious proposals for the trade-off, and the policy difficulties described below, it is inexplicable that BSEG has not addressed this issue in its final report. When this was pointed out to the Minister at a public meeting in March 1995, his (non)-answer was that international satellite and cable links are being developed. Is there an unknown agenda here? Or, despite its otherwise increasingly competent handling of network development, will the Government default in this important aspect of its planning?

With cable in place, the economics must be structured so that the price for overseas access to Australian service providers is no higher than for access to their local providers - a "distance-independent" pricing basis. It seems likely that such price standards will be set on the operations of the Internet rather than commercial on-line services; Internet is fast being accepted as the global distributed computing network upon which electronic commerce will be based.

Australian content providers must avoid domination by international gate-keepers such as America On-Line or Prodigy. US publishers lose around 80% of the connect-time revenues generated by their on-line business. Some are finding it more profitable to surrender the advantages of listing with these gate-keepers and choose to go it alone on the Internet. Domestically at present, Australian content creators can receive only 3-15% of the consumer price, with most of the proceeds going to post-publication marketing and distribution. The solution internationally for Australia is to build its own consumer brands for on-line publishing before the market matures, so that distribution revenues accrue mostly to Australia.

There is urgency in these developments if Australia is to grasp the advantage. All the participants must begin to offer the technologically practicable services now. Until 1997, ISDN (narrowband) is a mature technology that could deliver MM content to consumers over the telephone system - if Telecom could be persuaded to lower its tariffs. Coaxial/fibre optic may have worthwhile market penetration by 1997. There are functioning examplars of such services in the US.

Singapore, prospectively one of Australia's strongest competitors, already has begun a comprehensive program, the Intelligent Island, intended to build high domestic IMM literacy and to establish Singapore as a global on-line service provider at ISDN bandwidths, through good, low-price services. With this hub status, it is anticipated that service providers would begin to create content locally.

Cutler notes in passing that Singapore has a cooperative agreement with MIT's Media Lab. This could be more than a footnote to the Singapore plan; the Media Lab is one of the world's most fecund sources of advances in IMM technology. In the proposals for government action, Cutler suggests in passing

some CSIRO involvement in a research program, but otherwise does not address this issue. BSEG advocates fostering R & D somewhat more explicitly. If we are players in the game of first-mover advantage it is a dimension that needs more consideration. Various authorities have pointed to the importance of the development of user-friendly systems in attracting a mass market for interactive product. Frater and Elsum claim a particular facility among Australians for this sort of inventiveness, but note that it must be supported by investment if it is to advantage us. (15))

Inducements to international investors

Although the move to on-line delivery could circumvent oligopoly distribution problems, Cutler does not believe that this obviates involvement of major international firms in Australian content production. The report envisages continuing involvement of the majors as investors, and proposes various government inducements to attract key people and firms to domicile important offices in Australia over the next two or three years. This could be the quickest way for Australian IMM firms to scale up.

One of the key inducements, and perhaps an essential precondition, says Cutler, is to construct here the world's best copyright regime: the simplest, fairest and most certain, the cheapest and quickest to process, and one which deals effectively with the many problems of convergence. Some of the copyright problems of the new media are addressed in the recommendations of the Copyright Convergence Group (12), to which the Government has made a commitment in *Creative Nation*. The most important recommendation is for a right of transmission in intangible form to the public by any means, encompassing the existing right to broadcast and extending and replacing the right to transmit via a diffusion service. (This right would remain separate from the public performance right.)

Other proposals have come also from private sources (For detail, ibid. p.22) The Cutler report itself proposes that the holder of moral rights will give automatic permission for *anonymous* re-use of a work by the act of entering it in a digital repository. This would ease the complex problems of identifying ownership in works from which it is proposed to draw sections or fragments for incorporation in larger multimedia works. However, it seems to be wholly antagonistic to the push for moral rights which is barely won in many countries, and is bound to attract opposition from creators.

Other inducements to multinationals could spur the interest of Australian investors also: e.g. a proposed 150% R&D tax incentive for raising syndicated financing of IMM content development, and exemption from withholding tax of royalties destined for foreign copyright owners.

How to develop an Australian IMM workforce?

Similarly to films, IMM products are produced by creative teams. The skills encompassed are wider than for film since, after all, CD-ROMs and other formats can include film as one of many elements. There is an entirely new area of skill involved in devising the logic of interaction between the users and the materials - an interaction which must be both informative and entertaining, and could open the way for the user to manipulate or add creative content to the product..

Cutler describes nine key roles in the IMM production team (14. p.7). Among them are the production/finance, hardware/software specialist with commercial know-how, audio/video/software expert, language/editing/quality assurance expert, telecommunications/ broadcasting expert, project management/TV/film expert, information retrieval specialist, computer R & D specialist, and creative

director. In addition, hired on contract are the artistic people - script-writers, composers, musicians, animators, film crew and so on. In larger teams, there will be further division and specialisation. In smaller teams, individuals have to be multi-disciplinary to a degree.

Note that the field of multimedia does not require artists or other individual practitioners to be skilled in all disciplines. Rather, at the professional level, multimedia products depend upon an essential collaboration between people expert in the respective contributing disciplines. Contrary to some current propaganda, it seems to the writer that this principle of collaboration will characterise sectors of future artistic practice, rather than broad multiskilling of individual artists. There have been abundant opportunities in theatre, opera, dance production, television, film, for the emergence of multi-skilled artists. But, the few polymaths and performance artists excepted, specialisations become more pronounced as disciplines become more complex.

C.P. Snow criticised the idea that education could produce a new Renaissance person. The world, even then, had become too complex. And yet, says Bill Buxton, himself something of a multi-disciplinary wizard, "...one of the lies being sold today with multimedia (is that) you, too can be a Renaissance man or woman. You can be a good graphics designer, sound designer, scriptwriter, salesperson, and scientist, all at once... Renaissance teams? Yes. Individuals? No." (9) There is a power in this team approach not only because of the special strengths of the individuals, but remembering the factors favouring evolution, emergence and creativity, the coming together of diverse, even dissonant, approaches to a common problem.

The envisaged expansion of the IMM industry will require many more members for the professional talent pool. On Cutler's estimate, in five years time, the industry could employ 50,000 full time professionals. At the content development end, the current output of directors and audio-visual technical people from tertiary institutions is 300 per year. Cutler believes that this output must be expanded ten-fold. Such an expansion could not be sourced totally within Australia, and it would be necessary to import experienced trainers. An important stimulus to training and development has been suggested by both the Broadband Services Expert Group and Cutler: to establish facilities and precincts where technical and creative talent can mingle, fire off each other, build new ideas and projects. This is the spirit of the Media Lab, where, however, the creative drive is fuelled also by a multi-million dollar budget.

The implications are not only for an increase in the tertiary establishment but, in order to produce quality from a quantity base as in other comparable disciplines like music, a very broad offering in schools. Children should be offered an environment in which they swim in CD-ROM, and know the medium as intuitively as they know television. It is the children and young people who already are at ease with the computer world. The emergent (in the complexity theory meaning) interactive forms probably will originate with the next generation. Arts education planners should note the opportunities here for an expansion of arts participation in schools (or for a contraction if the opportunities are missed). While the value of a face-to-face transmission of an artistic tradition cannot be displaced by a machine, there already are wonderful IMM arts instruction programs available which offer student-centred learning of a sophistication which frankly could not be delivered by normal classroom methods. Such product could be developed in Australia. We also have special problems in distance education which could be met through self-instructional IMM courses.

Cutler's policy recommendations for the development of an Australian IMM content industry

The recommendations are laid out in four areas of policy development. Following are enough of the recommendations to convey the flavour, and draw attention to those especially relevant to the arts. The sections in italics are the author's comments or indicate actions taken to date by the government.

1. Build highly skilled development teams

In addition to the objectives to build an IMM-literate community from the schools up, and to expand professional training:

- facilitate access to tertiary IMM facilities for off-peak use by commercial content developers

- recognise creative work as a form of research under DEET and ARC guidelines;

This non-recognition has the consequences not only of denying ARC funds to creative artistic work, but also reducing the level of funding to university arts departments; artists in the academic community are attempting to reverse the relevant policies.

- establish creative precincts to seed new creative teams;

This seemed a warm and cuddly proposal whose modus operandi was not very clear; the government has announced a more clear although perhaps less flexible strategy: viz. to set up Cooperative Multimedia Development Centres with a mixed purpose of education and production, and to mount a series of state- and sector-based industry forums. Note that we should not become too self-congratulatory about the establishment of these centres, despite the government's PR stance that they will put us in the forefront of world interactive communications developments. Other countries have had their particular versions for some time; we have to catch up.. The Media Lab at MIT was set up in 1985. Canada has five spread around the country.

- set up an IMM project financing fund to assist private sector funding, with the net revenues reinvested;

Under Creative Nation*, the government has undertaken to set up a $45 million fund.*

2. Aggressively foster an IMM publishing industry located in Australia, based on both local and global firms.

This requires immediate action to

- attract to Australia the Asia-Pacific RHQs for *all* (*that seems exceptionally ambitious*) major US and European book publishers, record companies, specialist financiers of audio-visual projects, film studios and news and magazine publishers, especially those experimenting with on-line content and service delivery.

Should this happen, non-IMM opportunities for artists might also follow..

- develop special mechanisms for "enhanced credits" for content development activities, provided that the intellectual property is resident in Australia, and royalty streams are under local management and available for local re-investment.

- provide a 150% tax incentive for syndicated financing, which also locks in repatriation and reinvestment of royalties from international sales; eligibility requires marketing and pre-sale commitments;

(There already are tax inducements for syndicated financing that are attracting investment in multimedia; however, the government in its Creative

Nation *statement showed no inclination to do more than urge more use of opportunities under existing taxation law.)*

- establish a new copyright regime as described already;

In Creative Nation*, the government promises various actions of the type proposed by Cutler, but does not deal with the proposal for testing the efficacy of proposed new laws.*

- encourage equitable alliances between local publishers, and international firms with distribution channels.

3. Ensure early trial and roll-out of an on-line services industry competitively positioned to serve local, regional and global markets.

The overall objective is to bring forward the timing of the market development in Australia of on-line MM services. This would require the government to negotiate appropriate carrier infrastructure investment and tariffing policies and induce the development of very large broadband capacity with North American, Asian and European consumer markets; and

- encourage wide ISDN consumer service in Australia by early 1996

- mandate it upon the Trade Practices Commission to ensure that distribution bottlenecks do not arise on the carriers and to maintain the maximum competitive pressure on carrier, gateway and database or packaging levels;

Recall that the government already has refused to allow the cable companies to limit access of other service providers to their networks.

- provide access for local and international on-line service providers to government-sponsored R & D projects, including some involving variously the AFC, AFRTS, Film Australia, the Centre for the Moving Image and the NFSA

In Creative Nation*, the government promises funding to a number of organisations to launch them more decisively into IMM production.*

4. Instigate initiatives by government and its agencies as owners, users and producers of content services to facilitate the development of the IMM industry.

The government as a business could be the biggest single catalyst for accelerated industry development. Important possible initiatives are steps to

- provide on-line access to culturally significant data, through early digitisation of national collections and archives

- build business opportunities for local IMM content developers through out-sourcing department requirements eg in development of student-centred training programs.

Creative Nation promises funding of ten CD-ROMS on national cultural institutions, with copies to be provided free to all primary and secondary schools. This is the only undertaking to respond to the proposals in section 4. Note that there are abundant opportunities for IMM developments in education whether or not funded by government. These can involve distance education - not only to remote Australian locations, but overseas: we can import students electronically; informal collaborations via computer-mediated communications like e-mail and collaborative authoring, information discovery through the "electronic library", and course administration.

- back R&D and trial of software tools for intelligent human:system interfaces and intelligent search, access and retrieval to assist consumers and content-generators to find government information.

See the note above about the Singapore/Media Lab agreement. This seems to be a crucial aspect of the developments elsewhere, very much influencing

investment decisions. In Portland, Oregon, there is a test program based on principles of open access and user-orientation, in which government, cable corporations, other interested business organisations, and the non-commercial sector including tertiary institutions and cultural organisations such as museums, are cooperating and providing resources. There is a similar program in Toronto, Intercom Ontario. If it is necessary for North America, why not Australia? Scenarios can be imagined where such trials could be initiated by the arts sector, or more pertinently, the content producers, including the arts sector.

- undertake a major investment in Australian cultural content on IMM as an important sub-set of global IMM content available from Australia - e.g. content around cultural tourism, Australian museums, libraries and archives, children's products. Cutler proposes that much of this product will need to be tailored and adapted to the culture of each overseas market, and that the original cultural context thus will not always be retained. But because government has a special responsibility to preserve context as well as content, Cutler plans that this will be met by ensuring digital archiving of the nationally significant data.

One might ask if this data is only held in the archives, what is happening to the living culture? To what extent are we willing to allow our identities to be defined by the pursuit of the market? This does not have to be a black and white matter, but if we are playing with grey we should be sure that it's a light shade.

A whole-of-government approach is needed, and identifies tasks for various departments including Communications and the Arts, Education Employment and Training, Industry Science and Technology, Attorney-General's and others.

The implications for the arts

The communications highway, on the face of it, is not so much a means to the production of new forms of art, as of enabling the dissemination of the arts to a larger and more far-flung audience. However, it is also already apparent that by radically altering the possibilities for communication between ordinary individuals, and between artist and artist, and artist and community, the highway can stimulate the appearance of new art forms, the way art is produced, and the function of art in society.

Wider dissemination of the arts

The most obvious prospective use of the highway is in wider dissemination of more arts product to audiences via satellite or cable. This does not depend upon the development of a taste for interactivity; the most that need be asked of an audience is that it should choose what it wants to watch. Because of the number of channels available, in theory there will be a motivation to serve minority and niche audiences and arts programming should become more plentiful and diverse. This programming might be available in a particular city or region via the local cable network. Through satellite broadcasts it might go to a much larger region, or even be shown globally. And with development of the global cable network, there is prospectively a worldwide mosaic of niche audiences to lend some financial viability to even the most esoteric of arts products.

Arts program content on the highway could be much as we see on free to air television: i.e. usually a traditional arts form minimally adapted for the small screen. Occasionally there are broadcast productions whose essential form is influenced by the television format. There is an avant-garde of video production whose product, ironically, is hardly ever seen via broadcast; perhaps it will find a niche. But the main point here is that the highway can provide wider access to the conventional arts in a small-screen representation.

Effects of wider electronic dissemination on live performance and free to air programming

Some questions arise. Would plentiful availability of the arts in the living room undercut their support from live audiences? Such fears have been heard in the past. Cinema would see the end of live theatre, and television would see the end of cinema. All were shaken, but continue. Radio and recordings did not bring the end of live music. It is said in the USA that dance has survived because dance television broadcasts expanded its live audience. It is also said that the total audience for the arts has expanded through the addition of viewers who find it convenient to watch the arts on television but will not attend live performances.

There is concern about the effects of user-pays television and radio services on the mainstream free-to-air programming. Commercial television programming is now directed to a mass audience and perhaps there is little to throw off more profitably to a smaller, special interest, user-pays audience. The commercial channels seem more interested in obliging their *mass* audience to pay for entertainment it most values but now receives free, such as major sporting events. The government has thought it necessary to require that major sporting events should be retained on FTA television and not confined to subscription channels.

The more interesting cases are those organisations now addressing some quality needs of smaller audiences. For instance, ABC Classic FM, the ABC's classical music network, changed its programming in the direction of downmarket early in 1994. Clearly, ratings are a motivation, and the word is that they have risen. ABC Radio is preparing now for possible introduction of five subscription audio channels: Opera, Jazz, Teen Hits, Nostalgia and Ambience (!). Opera and jazz are now included in ABC-FM programming. (Says a contemporary music afficionado: "So is nostalgia".) Fears are heard that in due course, all music containing anything of challenge will be shunted off ABC Classic FM to pay channels, leaving it with Classic Hits and wall-to-wall Vivaldi. One possible implication is that listeners who do not already know and love the larger classical repertoire will not be able to discover it via this most accessible of means, radio, except by subscribing on trust to the specialist classical music audio channel; they cannot be expected to do so. This implication can be extrapolated to any other content of minority interest now available free to air.

It also applies very broadly in society and the marketplace, as increasingly sophisticated marketing techniques divide the market into smaller and smaller target segments to be catered to with specialised products. This is wonderful: we can each satisfy our personal desires very precisely. But what is it that we then all share culturally? Only the lowest common denominator programming of what is left of free to air television and radio? Games, infotainment, easy listening and red-neck chat shows?

Indeed, the opening up of these technological possibilities, combined with the economic rationalist philosophy of user pays and the political decline of liberalism could put at risk the very providers of some of the staples of our culture. One thinks in particular of the ABC. It was not assigned any central role under the recent Broadcasting Services Act, and seems to have been rather pointedly excluded from any benefit from the 1994 cultural strategy statement - perhaps for temporary reasons related to personalities and fashions in the government and in the ABC itself, perhaps not.

The ABC and SBS clearly provide programming which is not available on commercial television. Whether commercial user-pays television would be interested in addressing that market cannot yet be known, although through video-

on-demand services, it could offer access to art-house film. Rather, the question might be: what happens to ABC free to air services if they are in competition not with commercial subscription cable - but with ABC subscription cable? Remembering that the ABC audience tends to be skewed towards the higher income bracket, might not the government eventually decide that in a user-pays world, the ABC audience is capable of paying for its entertainment and that free to air service should be terminated? Or less calamitously, that the ABC continues free to air as a relatively independent news and information service, but that arts and all other programming is relegated to pay services.

Such a decision could deprive many people of limited means, of access to ABC arts programming or anything comparable. It also could have negative ramifications for the ethos of entertainment production and provision in Australia. Arts policy bodies might wish to consider these matters and devise appropriate strategies and policies.

Comparable issues arise concerning community broadcasters. Community television is embryonic in Australia and so has not yet shown its potential as a force for the arts. Community radio, however, is relatively well established. With the move by ABC Classic FM towards popular programming, a lot of committed music listeners have shifted allegiance to the alternative community stations. But ironically, the community stations are also being pushed downmarket because they depend directly on a subscriber base for their free to air services, and the small amount of government funding they could use as finance and imprimatur for more adventurous programming is rapidly declining. Some are thinking of specialist user-pays services. So one future prospect for community stations, established to serve the local or specialist interests of particular audiences, is for low common denominator free to air programming and perhaps user-pays specialist programming.

It is the government and community stations which now broadcast, sparsely, it is true, the works of more experimental artists. If their staple free to air progamming moves further towards the centre of the road, the contrast between the usual fare and the experimental becomes more dramatic and the experimental has even less of a place. In theory, it might be moved to a user-pays service. But would it have a sufficiently large audience to financially sustain a pay service? Probably not. The audience now for broadcast of such programming is much larger than for live performance. If there is no broadcast of this material, that audience is lost, probably with negative effects on the size of the live audience.

In sum, there is a nest of dilemmas. The majority interests could be free to air, and minority interests served through user-pays. But if the minority is too small, the payments will not sustain the service, and in some cases culturally valuable materials will have no outlet. Or, majority services could be paid for by users simply because they are the most popular and profitable, and minority interests served through free to air. But this is socially inequitable, and also puts free to air in a politically vulnerable position. Or, all interests could be served by both segments...

Other possibilities for arts dissemination

The highway will be useful not only for transmission of arts and other product direct to consumers. In the US, major film companies will send digitalised transmissions of movies to cinemas for showing on the cinema large screens (with some reduction in image quality). These films can be digitally edited into versions suitable for particular audiences: e.g. the saccharine cut for matinee showing to children, the complete ghastliness for night-time showing to adults. Since the film

as physical object no longer has to be transported, programming decisions could become much more rapid and flexible. But the capital investment for the cinema owner is high, and it is predicted that smaller cinemas could be put out of business. Presumably this could mean a greater stranglehold on distribution by the large production houses and distributors, a constraint which already damages the prospects of the Australian industry.

In a low interactivity environment, such as that now available to users of the Internet, it is possible to gain direct access to a wealth of artistic artifacts which are manifested in a static visual image: viz text, representations of painting, sculptures, graphic arts, music scores. Also available are ever-enlarging data-bases which list these artifacts, provide information about them, make it possible to discover their whereabouts and gain access to them. On-line services such as Prodigy give access not only to basic references in various fields, but to current reviews of the theatre in your town. Publishers are beginning to offer on-line editions of their books in addition to the print versions, including both the literature itself and critical writing about all the arts. The network is also used now to advertise arts products. For instance, a Santa Fe art gallery shows images of the paintings it has available for sale through a Santa Fe arts organisation's World Wide Web site.

Because text-based information can be handled by the existing narrowband telephone system, the publishing industry is feeling the effects of the communications revolution earlier than other art-form-based industries. The changes occurring in the publishing industry are complex and so far only in part technology-driven, and will be taken up in more detail in the next chapter. Suffice to note here a number of developments related fairly specifically to the possibilities of on-line access.

The catalogues of some thousands of libraries are available and searchable on-line. Time-sensitive publications such as newspapers and magazines are increasingly available on-line. Newspapers can include not only the articles published in the hard-copy editions, but those rejected. "Intelligent agents" will soon be available to scan this material and select items fitting the interests of individual readers. While newspapers are financially powerful, they are losing ground in some kinds of advertising and have a declining readership. Rocketing paper prices are challenging the financial viability of hard-copy papers, periodicals and even books. Easily portable computers will be available that can be carried like a book, able to screen literature, articles or news from discs or cards inserted into them, or from owned or borrowed on-line connections. (A problem with text on screen is that it is difficult to scan or browse.)

The format of some on-line magazines is changing to take advantage of the electronic medium. *Hotwired,* an experimental publication of the very successful US hard-copy magazine *Wired*, accompanies text with sound video clips, digital animation and interactive features. Interestingly, it sees itself as competing with television rather than publishing. Some CD-ROM versions of books also include multimedia, and can be available on-line subject to bandwidth constraints. There are prospects for immediate in-store printing of individual book titles on customer request, with the text received on-line from the publisher. There is a similar service for music CDs already being tested by Blockbuster stores in the USA.

The Internet as a tool for arts development

Schmoe Elhay, the Adelaide jazz musician, is also Dr Sylvan Elhay, Associate Dean of Engineering at the University of Adelaide. One day in early 1994, Schmoe phoned in great excitement. He had just printed out from his

computer an entry in facsimile from the diary of the papal master of ceremonies Paris de Grassis, dated October 31, 1512. De Grassis had just attended the vespers service for the first public viewing of Michelangelo's ceiling in the Sistine Chapel. This was an on-the-spot bulletin.

The diary entry came from a US Library of Congress exhibition of materials from the Vatican Collection. Schmoe had gained access to it via the Internet through his own computer at the University of Adelaide. "How long did it take you?" "All up, about a minute and a half to get to the Library, and a couple of minutes searching to find what I wanted," he said.

Under a recent agreement with IBM, the manuscript collection of the Vatican Library will be scanned into computer (a 50 gigabyte project) and then, subject to operational decisions, could be available on-line to viewers anywhere. (27) At present, one can gain access to these manuscripts only by going personally to the Vatican Library in Rome. There are some restrictions on entry, and the demand is so great and the library accommodation so limited that once there, there may be no place to work. A personal visit to the Vatican Library is expensive, difficult - and for these purposes, will soon be redundant.

The Internet is so much in the daily press that every reader must know of it. Yet one's ordinary social contact suggests that it is not yet widely understood. Here is a very simple introduction.

You have a computer on which you do your word processing. Perhaps you even have a scanner - a device that could be thought of as allowing your computer to fax itself any image you put through the scanner, whether print or graphic, and in case of print, to understand the verbal content.

Your computer might be part of an office computer network. In this case, there could be an internal agreement that others in the office can gain access through their computers to these materials you have placed in your computer, and vice versa. You could also 'mail' information from your computer to theirs, and a symbol on their screen would alert them to its arrival.

This sort of local network can be set up not only within organisations, but between organisations, or between any parties with a common interest who are willing to establish the necessary cable connections. Within the office, the cabling is directly between the computers. Beyond the office, the cabling is provided by the telephone system.

The Internet is a network of some local, metropolitan and wide area networks (said to number about 27,000 in 70 countries as of March 1994 (14, p.31). If you want to connect with another network, you call it up somewhat as you would by phone. Your call passes to one of many "Gateways", the Grand Central Stations of the Net, where a computer will search for the way to link you or your message to your intended destination. But there is no Very Grand Central to administer the whole network.

Since there is no central administration there is no control of the growth of the Internet, nor any way to know accurately its size. In fact, watching the figures published in the press every few weeks, one would have to conclude either that no-one has any idea of the size or that the reality checks are so difficult that people simply invent a number that gives them pleasure. One of the smaller numbers, published in March 1994, estimated Internet then at present some 2.2 million computers, among them many supercomputers, with 120,000 computers and 500,000 users in Australia (Ibid). In May 1995, a newspaper report offered the number of 45 million. One thing is sure, as they persist in saying at the end of television news stories where presumably everything else is invented, the Internet

is growing rapidly. Depending on one's source, it is said to be doubling in size every year, or even every six months.

There also is no comprehensive map or directory. You have to find ways to accumulate the 'addresses' you need to make use of the Net. People accumulate their own private lists. Special interest groups establish lists which they may publish electronically. Various networks also have internal directories which you can access once you find out how to reach their node on the Internet. There are special services on the Net which will do your searching for you (e.g. Gopher, or WAIS). And a number of publishers have released hard-copy directories to parts of the Net, often of a specialist nature.(19)

Internet as a means of publication

The Net is used as a means of publication. Paris de Grassis didn't have this option, but 400 years later the Library of Congress has chosen it for him. Manuscripts by living authors, whether or not published in hard copy, can be made available on the Net. If an entity has a collection of such materials which it wishes to offer on the Net, it can establish itself as a World Wide Web site - as has the Library of Congress. There is a directory of World Wide Web sites. When Schmoe wanted to find a way to the Vatican materials in the Library of Congress, he clicked into a program called Mosaic, which has the map of WWW sites.

The World Wide Web is the first Internet interface to use hypertext or hypermedia techniques accessible to consumers. ('Hypertext' and 'hypermedia are terms applying to a combination of print, graphics, moving image and sound.) It permits communication of audio and video as well as text, over telephone ISDN systems, and therefore access to this hypermedia is possible over parts of the existing telephone system. (14, p. 32)

Internet, and community arts in the global village

Mitchell Kapor of the Electronic Frontier Foundation, a very influential force in the communications debate in the USA, comments that there is the "broadcast model" which by its structure limits the number of program originators, and "breeds consumers, passivity, crassness and mediocrity", and the "internet model, a networks of networks which no-one owns and has lots of points for inputting content: this model breeds critical thinking, activism, democracy and quality". (31, p.50) While there might be some dispute on the issue of quality, the rest of the characterisation is plainly true. It might be noted that in terms of the discussion of Chapter 3, the Internet is very much a bottom-up structure, whereas broadcasting is exclusively top-down, with talk-back radio the exception that proves the rule.

There is a community arts practice on the communications highway. The Internet is used to tell personal stories. The motivation may not be artistic (neither, originally, was dot-painting), but people want to put their point across effectively and so will be concerned with expressiveness. This is apparent from the quality of some of the writing. Also there are protocols for brevity and concision that encourage writers to tell their story in a paragraph or a page, so influencing the forms. The stories are accessible to members of a particular circle or openly accessible, and so invite and receive responses from other writers. The effect is an instantly published correspondence between, as it were, intimate strangers.

Works of fiction are written collaboratively on the Internet. Under one procedure, the participants confer by e-mail to decide the direction the next chapter of a novel will take, and then one is assigned to write a chapter. There is nothing to prevent dissidents breaking away to write their own chapter, and so a work may take a number of diverging directions. In another, there is a sort of

massive collaborative fantasy in which participants will assign themselves characters in playing out a theme such as Star Trek. Playing on the Internet might have a freeing effect a bit like wearing a clown-suit in the non-virtual world.

To the extent that the Internet depends on the world's copper wire telephone systems, it will remain very much text-based, although it can carry graphics efficiently enough for some purposes. Because of the narrow bandwidth, digitised sound or moving images can only trickle through. It could take hours to deliver the digitised version of a sound movie and high interactivity is out of the question. Other forms of community art may appear as switched broadband systems spread.

The communications highway and new possibilities for arts production

The highway will open new possibilities for arts production. For instance, it will be possible to work directly with artists who are physically remote. Already, there are various instances of simultaneous music improvisations between improvising partners in cities at the opposite ends of the world. At the Synaesthetica '94 symposium on computer animation and computer music in Canberra in July, computer musicians and graphic artists in Canberra and Adelaide collaborated through linked computers to create real time works. In November, the Kitchen in New York opened its Electronic Cafe, modelled on one already operating in Paris. The third of the inaugural performances included musicians in New York and Santa Monica, California, playing simultaneously. Several works involved two pianists, one in each location. Also in each location were two computer-driven Disklavier pianos. One was performed by the local pianist, the other responded to digital signals from the remote pianist, the result a duet for two pianos in each venue.

One had the feeling that this was a sort of gimicry, and indeed, Morton Subotnick, the MC of the proceedings in New York, admitted that at this early stage we are using new technologies to express old forms. In due course, new forms would arise from the possibilities of the technologies.

But the network will make direct collaborations possible, more urgently motivated than that between the pianists. Writers, composers, graphic artists, animators in remote locations can work collaboratively in real time. Artists could present work directly to distant clients. It becomes feasible for a producer to contract with designers who will exactly suit the needs of a project, regardless of their country of residence, and work with them virtually as effectively as if they were on-site. The market becomes international and standards, artistic and professional, follow suit. This is both a threat to local artists, and a stimulus. There are also implications related to the cost structure. Australians will be underbid by East Europeans but can underbid Scandinavians, based on current exchange rates.

These are forms which arise out of the new communications possible between people on the highway. Other developments may emerge through formats such as CD-ROM and new technologies such as those in computer animation. The artefacts resulting from these developments can be disseminated across the highway but arise independently of it, and so will be covered in the next chapter.

The arts in the CBD: possibilities following on the growth of telecommuting

Earlier in the chapter it was noted that the Arthur Andersen company has already reduced its office space requirements in the Sydney CBD because the new telecommunications make it possible for employees to work on the road or at home and maintain adequate contact with the central office. This trend potentially empties much existing office space in the central business districts of our cities. Other factors have combined to do the same: e.g. the escalating rental costs for

CBD office space, and the move to regional centres where rents are lower or a labour force is more easily accessible.

Concurrently during the recent recession, construction companies, lacking work in office construction, maintained some level of activity by building high-rise apartment blocks in downtown areas. This began a trend towards greater use of the CBD for residential purposes.

One can hypothesise that with more and more downtown office spaces lying empty because of the communications revolution, that trend might grow with economic forces pressing for its renovation into living quarters. For the success of such a supply-driven strategy, large numbers of people must be converted to the proposition that downtown living has a lot to offer. The most obvious way of making it attractive is through an increased provision of cultural and entertainment facilities.

Will this proposition enter the minds of the construction and property industries? It certainly will, if arts planning bodies put it to them. There could then be an unusual alliance of interests working in support of the creation of new cultural venues.

A few random thoughts about other ramifications for the arts

- The new artistic forms which arise from new communications technology - or from new technology generally - are bound to emerge from young people who have grown up with video games, computer-generated arts, interactivity. As noted at the beginning of the chapter, they have an ease with computer technologies which are alien to much of the older generation. It may be that for the coming generation, the electronic media are so pervasive that they will regard as traditional any "real" artistic product as opposed to virtual product, even when the former is within its sphere innovative. This obviously would have major ramifications for artistic production and consumption in another decade or so.

- The government interest in in the development of an IMM content industry, if pursued along the lines envisaged by Cutler, could translate into production of lowest common denominator material in the pursuit of the export dollar. This might especially be a risk because of the discontinuity between the traditional arts and the precepts of the new media, set alongside commercial imperatives driven by non-arts people. How can arts integrity survive, and more - participate?

- There is a potential for the new media to support an expansion of arts education. But how is traditional arts education seen in this context? Irrelevant? or as a core discipline/value? There is a potential to unload ancient baggage and introduce more effective, individualised instruction - but also to replace blood and heart with logic and technology.

- The communications networks potentially expand the possibilities of distance education. If ISDN has a national reach, then text and data based information can be transmitted and students can interact with it. However, if significant developments are made in educational materials which require broadband cable for transmission and interactivity, but for economic reasons the "reach" of broadband excludes those in the most remote areas, the people who could most benefit from these new educational strategies still will not be able to avail themselves of them.

The highway as an aid for new forms of arts management

Finally, some observations about the possibilities presented by the highway for organising and managing the arts. Clearly, it facilitates contacts between

remote managements and will allow the passing of complex information, including representations of artworks or performances, instantaneously. Agents and managers are making individual use of these possibilities as they develop. There are broader discussions also, as for instance at the conference organised for Montreal at the end of 1994, which dealt with the technological possibilities and how they might be used to foster an ethos of cooperation rather than competition.

The bulletin board is a device which could be extremely important to arts policy planning and implementation. A local network can set up topics for discussion, each one with its own 'bulletin board". You type in an opinion on a current issue and send it to the screens of the other participants in the discussion; they respond, and so on. Members of the new Music Council of Australia, who are physically dispersed around this large country, have agreed to establish a bulletin board and use it as their main vehicle for policy development, supplemented by telephone conferences and once a year, a face-to-face assembly. Access to bulletin boards can be restricted or open, according to the wishes of their organisers. Some topics under discussion by the Music Council could be accessible only to members, while others could be thrown open to input from anywhere on the Internet. This might produce some interesting cross-pollination from sources outside Australia.

This is not a unique decision. The Board of the National Association of Artists' Organisations in the US already conducts its meetings in this way. They are held over a period of one or two weeks. The members log on and offer their view on the various agenda items. At the end of the period there is a process through which policies and decisions are produced from the previous input. The procedure seems to offer a number of advantages: input can be more fully considered, the dominance by personality rather than content could be ameliorated, and there are great savings in travel costs.

More generally, there are devices which allow much broader involvement by the arts community. In Australia, Artsnet, based in Adelaide, is setting up a network. The International Theatre Institute in Sydney is verging on a decision to do the same, with its large arts data base as an added inducement to membership.

It is interesting to look at a service which is permitted by its circumstances to have reached a later stage of development. Arts Wire is a national computer-based communication network for the American arts community, set up by the New York Foundation for the Arts. The Foundation is a service and grant-making organisation with a budget around AUS$16 million drawn from both government and private sources (parenthetically, a structure which itself might be investigated for possible emulation).

ArtsWire "enables artists, individuals, and organisations across the country to better communicate, share information, and coordinate their activity. It provides immediate access to news, information and dialogue on conditions affecting the arts and artists today, and works to build a forum for the free expression of ideas among its diverse subscribers."

Among the key services and features are these:

- Hotwire: a timely summary of arts news with sources both on Arts Wire and in the field, prepared by the management of the service;

- AWNews: a facility for Arts Wire subscribers to disseminate news and information.

- AWHub: a discussion facility for Arts Wire users

- Artistwords: commissioned texts by artists who also participate as on-line 'artists-in-residence'
- Money: a searchable resource of grant deadlines and other opportunities for artists and organisations
- AWTech: a place to find answers to technical questions
- Arts Wire Directory: a directory of the people and organisations on Arts Wire.

However, the majority of resources and discussion areas are created by ArtsWire's organisational partners. Private conference areas are also available. At the end of 1994, it was host to 70 "conferences" on particular arts issues, one half of them private among parts of the membership.

The Hotwire report is issued three times a week. Many of the groups providing information for the service are putting their monthly newsletters into the system. But they also take information from the system to include in their hard-copy newsletters to members.

Subscribers usually pay from about US$25 to 50 per month total. ArtsWire pays a US$15 per month flat fee per subscriber to its host computer, and passes this on to its subscribers. In addition, it collects a subscription fee which it allows users to set according to their means, but suggests rates of $3 - 15 per month for individuals and $5 - 25 for organisations. They also pay connect charges which vary by use but work out to around $7 per month for the average user.

David Green of ArtsWire says that it took about three and a half years to prepare the ground for ArtsWire. There was a fairly substantial set-up cost, which was covered by the National Endowment for the Arts and a number of private foundations. The running costs come from earned income and a mosaic of grants. Any service established in Australia could benefit from the resolution of the difficulties in other services such as ArtsWire, and so the establishment times and costs could be much diminished.

The benefits of such a computer network depend partly on the number of members and the level of participation, and that presents a chicken and egg problem. Among probable obstacles to membership: many artists do not have computer access and may not be motivated to get it, they are daunted by the unknown, don't see the advantage, or won't join until everyone else has.

As of November 1994 Arts Wire had 700 members. Two years from now, Green estimates a membership of 5,000. Even with this expanded membership he does not believe that it will be able to pay its way totally from earned income, partly because the fee structure has to take account of the meagre financial resources of many of the artists sought as subscribers. However, the larger membership does bring some financial advantages. For instance, it will allow Arts Wire to set up its own host computer, reduce fees, and retain the remainder of the fee now paid to the external host. And the program content grows richer with a larger membership.

Arts Wire is in touch with other relevant networks around the country, and also is forming useful mutualities with similar networks in Canada and Britain, with which exchanges of information and facilities are planned. Similar opportunities would be available to Australia.

Conclusion: the highway, and planning for the arts

Particular implications of the development of the communications highway have been identified throughout this chapter. Some general comments might be made about the circumstances of arts planning in this context.

It is apparent that this is an extremely complex field in which new realities are inclined to overtake prediction. To stay abreast, form a comprehensive understanding of the issues, and foresee the problems and possibilities is a massive undertaking. There are rich opportunities for the arts, aided by an unusual understanding from politicians, the bureaucracy and business that artists have a fundamental role to play in the development of the content which will give meaning to the whole enterprise. Included in this understanding is an acknowledgement that it is important not only for profit, but for Australia's cultural integrity and sense of its own efficacy that we develop our own content and not be submerged totally in a flood of imported product. Some commensurate means are needed to keep the arts sector abreast of circumstances and give it a voice in the future of the communications infrastructure.

The government arts planning and policy bodies have a role to play. In doing so, they might consider the nature of their own power and the limitations imposed by their circumstances. It seems to the writer that they have strength and a responsibility in policy formulation, if they are adequately staffed for the work or can contract it out. They have the great advantage that they can fund implementation of their own policies, although in the communications area there is a great deal of important policy implementation lying well beyond their reach. Their role as advocates is enhanced by their inside line to governments but limited by their hesitancy (on behalf of themselves and their constituency) to bite the hand that feeds. They also have the potential to serve as sources of information, again if they are adequately resourced for the task.

The actual role to be assumed should follow on an evaluation of some of these matters, especially those of resourcing and the suitability of the organisational ethos for a particular task. Advocacy for the arts should be full bore, and it could be better to ensure that outside arts organisations can take it on, in the process putting an end to the quite unreal expectations from the arts constituency of the advocacy responsibilities of funding bodies, particularly the Australia Council. Indeed, it is quite inappropriate that the arts sector should depend upon an arm of government as its advocate to government. Whether the existing arts industry organisations have the necessary depth and fire-power also might be assessed.

If resources do not allow adequate time and skill for internal policy development, especially where it concerns broad issues beyond the disposal of the agency's funds, collaborations could be set up with suitably committed external bodies. Proposals seen from time to time about possible marketing roles for arts policy and funding bodies might be based upon misunderstanding, and should be assessed against the suitability of the organisational ethos, staff skills and the dominant organisational mission.

There certainly is a need to provide an informational service to artists to inform them of the possibilities arising in the new media and the information highway. This is a role very much suited to bodies like the Australia Council and the state arts ministries. It needs personnel who are immersed in the communications industry and will be aware of opportunities arising for artists, whether in experimentation or in direct productive alliances with commercial interests.

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