

**PRIME MINISTER'S SCIENCE, ENGINEERING AND INNOVATION
COUNCIL**

THIRD MEETING - 25 June 1999

AGENDA ITEM 6

**Clash of Cultures >>New
Partnerships >> Innovation**

What is perhaps more important than the new projects is the fertilisation of ideas that occurs from the 'clash of cultures' or perhaps more realistically, the 'fusion of cultures'.

Dr Stuart Bunt, Department of Anatomy and Human Biology, University of Western Australia on the outcomes of collaboration with artists Oron Catts and Ionat Zurr

16 June 1999.

Presented by:

**Mr John Rimmer
Chair, New Media Arts Fund**

This paper was prepared by the Australia Council, the Federal Government's principal art funding and advisory body. Through its New Media Arts Fund, the Council makes substantial investments in research and development between art, science and technology.

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INTRODUCTION

The invitation for the Australia Council to appear before the PMSEIC was extremely timely. This was mainly due to the fact that the Council had recently received the findings of its first major report *Arts and Industry Placements* a summary of which Mr Rimmer presented to the Council. In presenting this information, and an overview of the activities of a number of artists working with science and technology, the Council hopes to establish an on-going relationship with the PMSEIC and its current (and future) independent working groups.

Science and the arts create knowledge – the intersection between the two, the inevitable clash of cultures, leads to new cultures. It also leads to new partnerships that can and will lead to innovation.

Artists throughout the ages have always had a role in using their practice to interpret and critique cultural innovation. Engagement and experimentation with the new communications media and new vocabularies (made possible by technical and cultural innovation) are critical elements in the development of a living culture. Our challenge is to keep alive the process of experimentation, and to continue pushing forward the boundaries into the future.

Australian artists are ceaselessly forging new creative practices, which are widely recognised around the world. These practices can enhance Australia's ability to build upon our inherently innovative history while also working towards the development of greater innovative capabilities and an increased competitiveness in both cultural and economic terms.

This presentation demonstrates examples of some of the best work and significant achievements in this field. These projects promote creativity and innovation and have potential value-adding application in a global market place. In addition, enormous cultural benefits are gained by communicating a wider understanding and an evaluation of science and technology and this work by Australian artists can enable and promote an international visibility of Australia's cultural and scientific strengths.

Artists are not only embracing all aspects of computers and telecommunications, but also the concepts and artefacts of a wide range of biological and physical sciences and technology. Many are already working collaboratively and successfully with science and technology in areas as diverse as telematics, visualisation, mathematics, medical imaging, sound and, with new 'materials' such as plasma, electricity and tissue culture. These examples can serve to change the concept and understanding of 'what an artist is' and, more importantly, 'what an artist can do'.

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1. THE NEW MEDIA ARTS FUND

The New Media Arts Fund is the research and development arm of the Australia Council, the Federal government's principal arts funding and advisory body. Through this Fund, the Council makes substantial investments in research and development (R&D) between art, science and technology, and supports interdisciplinary arts practice which displays a critical and innovative approach to art and its context.

The Fund supports artists in their investigations of the edges of current art form practice often leading to a critical engagement with new technologies. Indeed artists are the ones who usually take new technologies and push them furthest, testing them in ways previously unimagined.

The Australia Council believes there are many possibilities and exciting opportunities for new partnerships between artists and industry as well as science. To find out if this was just an ideal or a practical reality, the New Media Arts Fund commissioned research into the potential for the placement of artists in industry, focussing on IT, telecommunications and broadcasting companies. Recently received outcomes of this research revealed that there was support amongst companies for the concept of artist placement.

Additionally, the research suggests practical ways in which the Australia Council, through the work of its New Media Arts Fund, may play an important role in encouraging companies to realise the great opportunities that exist through an expanded series of placements of artists across industry, science and education. It also suggests areas where co-ordinated action with other government agencies will produce a significant 'pay off'.

3. ACHIEVEMENTS NOT THEORY

Senator Nick Minchin, the Minister for Industry, Science and Resources, stated in early June that Australia must perform better in research, development and commercialisation if it is to seize potential major growth opportunities from the global, knowledge based economy. While Government support for innovation in industry has increased this year, there is still much to be done to encourage companies to undertake R&D.

The Australia Council aims to work closely with other agencies across government in a useful way to encourage companies to undertake R&D and to capitalise on the position of artists within our society as a catalyst for on-going creativity and innovation, particularly through working together with business and industry. The Council's interest is in exploring and realising the great untapped resource for R&D in this country - the artist - many of whom are being recognised worldwide, with invitations to prestigious R&D centres and medical schools. It is time for us to encourage them here in Australia, for the national good.

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The Council's recommendations are quite straightforward, practical and immediate. In essence they focus on the formation of new and wider partnerships for both economic AND cultural benefit, facilitated by government, scientific and cultural leaders who can offer recognition and rewards for this activity, by taking the vision out into the industry, academic, research and artistic communities. These partnerships flow from an innovative use of existing government arts, industry and civic enhancement programs where creativity and innovation are encouraged through the use of increasingly diverse networks in research and development teams. As such the Council proposed a new coherent national framework for collaboration between the arts and sciences.

4. THE ARTISTS

As was clear from the CEDA *Economic and Political Overview Conference* held earlier this year, factors such as knowledge, creativity and innovation are of growing importance in determining a country's competitive advantage. One of the challenges now is to understand the unique contributions artists can, and are already, making in areas of science, technology and multi-media.

As we become a knowledge economy, we all recognise that people are our competitive edge – artists can be a key to innovation and creativity in industry and science because of their ability to 'see things differently'. It is this ability to think beyond the square that has provided the competitive edge so evident in many of our successful knowledge companies today, and is the source of continuing advantage in the future. The exchange of information and skills can provide opportunities and unforeseen possibilities which will produce nothing unless they are recognised as such and acted upon. In addition, true collaboration evokes significant changes in participants by challenging existing paradigms and offering new perspectives. It is within this dynamic that a synthesis of ideas occurs, and as such, the process has profound potential for innovation.

Partnerships between artists and scientists also help to disseminate highly esoteric and technical ideas in science to a wider population. Artists are able to take scientific knowledge and concepts to the people through exhibitions and public events thus making the valuable research work more accessible and giving people a direct experience of scientific discoveries. This also raises the issue of 'scientific literacy', without which we cannot fully understand the changes taking place. As is illustrated in this presentation artists can play an essential role in communicating that change.

AUSTRALIAN ARTISTS WORKING COLLABORATIVELY WITH SCIENCE AND TECHNOLOGY ARE RECOGNISED INTERNATIONALLY.

Australia is often credited with having one of the highest take-up rates of new technologies in the world and this it appears is also true of its artists. In an assessment of overseas festivals and conference events covering science, technology and the arts, Australians are over-represented given our population size. The invitations to participate at key international events including Prix Ars Electronica, Berlins Transmedia, ISEA, Siggraph and Video Positive are an indication of the vibrant nature of electronic art-making in Australia and add weight to the references by media, curators and

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participants that Australian artists are innovative and unique. The forging of these strong international links allows Australians to operate at the fundamental level of conceptualising, and to some extent determining, current global new media arts directions.

4.1 FUSION

Projects funded by the Australia Council continue to explore the possibilities of technology with possible outcomes benefiting not just the Australian community, but communities worldwide. An immediate example is *Fusion 99*, a program held earlier in June in Sydney and organised by the Medien Faculty of the Bauhaus University Weimar, the Australian Network for Art and Technology (ANAT, who receive their major funding from the Australia Council) and The College of Fine Arts, University of New South Wales. *Fusion 99* was an experimental event from point to point over the internet. It was the first in a series of collaborative interactive 'telepresence' events which explored the current break down of definitions, dualisms and geographical boundaries possible via the internet.

The event featured the work of 12 artists and computer scientists from Germany and Australia, attempting to push the boundaries of cyberspace past simple e-mail and 'net-surfing'. By using the latest real-time technologies and collaborative techniques, the artists in Australia and those of Germany pair up to test new levels of interactivity, conceptual collaboration and virtual space. The work ranges from live audio streaming and installation, to video manipulation, to the use of various available net softwares which have yet to be utilised creatively such as net meeting or hotline chats, WWW sites and VRML possibilities and finally to the concepts of telepresence performance.

It promises to break new ground - furthering collaborative techniques between educational institutions, inventing new programs for net communication, as well as expanding current applications for use by creative artists and students. The intention is to hold a series of Fusion events over time, the history of which will form a body of knowledge gained through researched results capable of assisting the development of online protocols for telepresence events. There will then be the sponsorship of more online collaborative techniques between educational institutions, and simultaneously the testing of applications for industry standards by creative artists and students.

Clearly there are a range of commercial benefits from this sort of project (not the least being in the areas of video-conferencing) but because the activities are largely being undertaken by non-profit organisations, they are less easily quantifiable in economic terms.

4.2 JAMES MORRISON

One artist whose company and work is reaching global markets through the use of technology and multimedia is James Morrison Enterprises, a small business operated by Australian jazz impresario James Morrison, his brother John, and brother-in-law, David. The Morrison Brothers have always been entrepreneurs, and have always experimented with new technologies. Technology is being

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used to enhance their performances and through online concerts which can more creatively reach new and diverse audiences, no longer restricted by any physical or geographical location.

Their latest venture <<http://www.jamesmorrison.com.au>> illustrates how many of today's musicians are embracing the opportunities provided by new technologies in the development of their businesses on a global scale. The online medium enables them to relate directly to their audience by eliciting their contribution via 'live jam sessions', their participation through online concerts and their business by buying directly from the site from anywhere in the world. For the artists themselves this reduces the cost of producing their product, cuts business overheads and operational margins, and enables them to have greater control over their marketing and selling processes.

Creative people will want to push the boundaries and extract as much as possible from what is technically possible. John Morrison identifies the cost of bandwidth as being the biggest impediment to his company's ability to expand into new global markets, particularly in the prohibitive costs associated with the streaming of live concerts and 'jam' sessions.

We would be the first to put up our hands to work with some of the large technology companies in order to help develop better streaming audio and video. The recording technology is fine but it is the ability to deliver it that is the problem.

There are obvious commercial uses for these technologies, most notably for video conferencing, and high volume data delivery. Morrison states that his company made a conscious decision to maximise the use of existing technologies whilst keeping an eye out for avenues for future development, but the technological demands for this type of activity will continue to be pushed to the limit, particularly as other musical artists embrace these new technologies for their own marketing and product delivery.

4.3 ARTIST IN RESIDENCE WITH CSIRO

The Australia Council has developed a program for the placement of artists in industry which aims to benefit both through the introduction and exposure of each to alternative ways of thinking and more creative ways of dealing with their work. The Council coordinated a pilot program in 1998 which involved an artist working with a division of the CSIRO, and the success of this initial placement has led to the placement of a second artist.

As Artist in Residence, in CSIRO's Division of Mathematical and Information Sciences, Horst Kiechle worked with a team who are developing uses of virtual environment technology for displaying and interacting with scientific and industrial data. Virtual environment technology is used to simulate a 3-dimensional space in which the user can display and manipulate objects, data or a combination of both. The CSIRO is creating the illusion of a virtual (computer generated) environment through the combination of 3D stereo vision, surround sound, and haptic ('touch' sense) feedback, and because these are the same sensory experiences we meet in the real world, users of the virtual environment will be able to use their everyday 3D real-world sensory experience to make

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sense of the synthetic virtual environment. The more real is the illusion, the easier it is for a user to make sense of the data being presented.

The display of data in this virtual environment can provide unique solutions and insights to industry, especially in mining and medicine and the visualisation of and interaction with 3D 'virtual' mines can provide geologists, geophysicists and mining engineers with a far greater understanding of the environment in which they work. For example the advanced virtual environment technology has been used to convert mining data into a 3D representation of ore bodies for a better understanding of their shape, size and orientation – an understanding which is critical for effective mining operations.

The use of an artist working within this scientific atmosphere contributes to the creation and enhancement of the virtual environment, and the way it is used to make mining and other data available to users. This is because artists contribute their own understanding of the ways in which people interact with the environment and how the use of visual, sound and haptic (touch) elements can enhance the illusion of reality and the transmission of information.

As such Horst Kiechle contributed a 'non-engineering' perspective on design and visual display issues by providing practical examples of potential uses for the innovations and user-testing of software and hardware innovations.

The convergence of the computing, communications and content industries is creating an opportunity for innovation in the information age and this residency scheme is a tangible example of the multi-disciplinary approach.

4.4 LANDCARE VISION

A partnership grant from the New Media Arts Fund enabled artist David Carson to work with Landcare Vision, a truly innovative collaboration with a potentially significant long-term impact on sustainable farming practices. The project focused on farmers in the wheat-belt area of Western Australia and produced a collaboration which explored ideas that dramatically influence people's perceptions of what can be achieved in the landscape and in the fight against land degradation. It is an unique partnership between a multi-national mining company (ALCOA of Australia Ltd), a State agricultural agency (Agriculture Western Australia) and six farmer based landcare groups.

After working with the community groups and learning to appreciate both their problems and their solutions, Carson developed a new way of presenting visual images and information to an audience not necessarily familiar with contemporary art through the use of 3D technology. This resulted in some valuable insights into sustainable farming practices.

It is hoped that through this innovative collaboration the message of sustainable farm management practices will now be seen by a wide audience (both rural and artistic) throughout regional and metropolitan Australia. Already it has been used as part of an installation in the Landcare Pavilion at Perth Royal Show (seen by approximately 20 000 people) and drew very positive feedback. It has

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been presented to rural industry breakfasts, corporate business audiences in Perth, and will be a part of a 3D video presentation at the International Landcare Conference in Melbourne in March 2000. The major outcome of the collaboration has been the proposed multi-media *Touring 3D Cinema Exhibition* which will celebrate the Centenary of Federation and which will focus on environmental issues, the changing landscape in Australia and the regional communities who inhabit it.

This project encouraged a cross-fertilisation of ideas between people not normally involved with the arts and an artist whose work is based on the use of new technology. The presentations and exhibitions of his work will give a fresh perspective and a new insight into industries vital to the economy of Western Australia whilst engaging with environmental issues which affect all our lives.

4.5 MATHEMATICS

Jon McCormack is one of Australia's top computer animation artists. His work has been widely exhibited overseas at prestigious venues for the exhibition of electronic arts such as: ACM Siggraph Electronic Theatre, US (the first electronic work ever shown at this venue in 26 years); the International Symposium of Electronic Art, as well as more conventional gallery and public environments at the Centre Georges Pompidou, Paris. He has been awarded numerous international prizes and awards, particularly for his interactive installation *TURBULENCE*.

TURBULENCE took over 3 years to complete and is an animation which records the evolution of virtual organisms within a computer environment using the parody of natural selection. The animation was neither explicitly designed nor imagined but rather the results emerged through an interactive process between the artist and the computer. The computer software was authored by McCormack using mathematical algorithms and it encodes the representation of shapes and forms just as DNA encodes the construction of living organisms. The result is a work both exciting and disturbing, to the extent that Sony Music Video have now secured the rights to release the work on video.

4.6 SOUND

Dr Nigel Helyer is an Australian sculptor and sound artist who trained initially in the UK and then gained his doctorate at the University of Technology in Sydney. Helyer is about to begin a partnership with Lake DSP (Sydney) which currently produces the world's most sophisticated and powerful digital signal processors, capable of manipulating three-dimensional audio in real-time. This partnership aims to develop a system to be known as the *Sonic Landscapes* a new class of information display technologies which will present significant commercial and licensing opportunities. Lake DSP considers this project strategically important for its longer-term aims because it will allow the company to bridge the current gaps that exists between the home-theatre hi-fi areas of audio, acoustic display and telecommunications.

The Australia Council initiated a residency program with ABC Radio's *The Listening Room* in 1994, internationally regarded for its radiophonic work. This residency, like those at RMIT (the

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Royal Melbourne Institute of Technology) and ATR (the Advanced Telecommunications Research Institute International, Japan), allows artists to gain access to the specialised environments and expertise which enable them to push the boundaries of technology through the innovation of their artistic practice.

Much of this work has been recognised internationally. For example Norie Neumark produced a piece for *The Listening Room* in 1994 called *Shock* which grew into *Shock in the Ear*, a work which has won numerous national and international awards including the Interactive CD-ROM Award in the COMTEcart (Dresden 1998). Neumark has now been awarded a fellowship at Cornell University in New York to research a new project *Noisy Envelope Machines*; the genealogy of e-mail, which will form the basis of her next new media installation.

4.7 NEW MATERIALS

TISSUE CULTURE AND THE ARTS

Artists Oron Catts and Ionat Zurr are currently undertaking work in 'tissue culture' in the laboratories of the Department of Anatomy and Human Biology at the University of Western Australia. The Tissue Culture and the Arts (TC&A) is an ongoing research and development project into the use of tissue culture and tissue engineering as a medium for artistic expression.

The Tissue Culture and the Arts project sees tissue engineering as an artistic tool with enormous potential. Tissue engineering includes the way to produce body spare parts (bio-artificial organs), and this technology, if applied to the production of semi-living objects (a combination of living tissue and artificial support), can be used, for the first time, to create (grow) living sculptures. The artists hope to be able to design, construct and monitor objects which contain living tissue and to be able to sustain them alive outside the laboratories.

Their extraordinary work has attracted attention from around the world including a recent invitation to work in the laboratories of Professor Joseph Vacanti at Harvard University and the Massachusetts Institute of Technology, Boston, US. Professor Vacanti is both a pioneer and a leading figure in the field of tissue engineering. The basis of the artists' work at Harvard will be a large project in tissue engineering which has developed unique systems for the eventual implantation (for the purposes of organ and tissue replacement) into patients. The artists have a unique approach to tissue culture and tissue engineering facing different problems from those of the scientists with whom they work, but often requiring an exchange of ideas for their solution.

This invitation is one of many examples of the world-class recognition attained by some of our artists. It also illustrates the significant opportunities available for Australian artists to work with leading edge technologies and to further contribute to the global collaboration between art and science.

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ELECTRICITY AND ENERGY

Electricity is an all pervasive element of our everyday lives, little understood and mostly taken for granted. The artist, Joyce Hinterding, has produced installation works that explore auditory, and more recently electrical phenomena and her interest has led her to make contact and work with people from a diverse range of disciplines including physics, electronics, antenna design, music and solar research. In 1999 the New Media Arts Fund supported her continuing work into plasma, high voltage fields and alternative energy sources. Much of her work crosses many disciplines within the arts by drawing on sculptural and new media concerns and this is combined with research from science and engineering, particularly utilising more efficient power systems which are being developed for an increasingly electricity dependent culture.

Hinterding's interest in energy as an artistic material and the resulting works and the documentation produced through this endeavour have brought forth new ways of thinking about energy into the public arena. For example works produced for the University of NSW Centre for Photovoltaic Devices and Systems included some spectacular and unusual images taken from work being done in Australia that have been used to further public awareness of possible alternative energy scenarios.

4.8 ENGINEERING

D3 Product Design is an industrial art and design company based in Sydney which mainly pursues opportunities within the Australian market, but is able to reach international markets through the marketing of its products via multinational clients. As a small business where customer relationships are the key to success, D3 Design is exploring and pushing the boundaries afforded by new communications media to enable their clients to participate directly in the art and design process, particularly by exploiting the digital interface between sophisticated 3D computer aided design software and the internet. D3 Design is utilising the technologies available to seek greater commercial opportunities worldwide for their design ideas.

4.9 FILM SPECIAL EFFECTS

The television series *Farscape* is one of the most complex projects of its nature due to the intricacy and sophistication of the number of shots required. Garner MacLennan Design (GMD) won the opportunity to undertake the animation and special effects against major UK and US companies mainly due to their design capability in undertaking a project of such sophistication. The project is currently up for a nomination for an *Emmy* Award for Television and has enabled GMD to expand its knowledge base in both creative software and project management as a result of undertaking this work. Commercial opportunities now exist for the company to pursue other international projects (competing against major Silicon Valley and Hollywood companies).

Although no government funding was provided for the research and development in this project, the achievements within Australia's film industry provide often clearer examples of how world-class

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achievements of design within software can help companies to both capture and influence global markets. GMD do their own R&D and training in-house and budget for this as part of the project itself. However, being a very capital intensive industry, it is important to recognise government decisions on capital gains tax laws and laws governing venture capital seriously impact on the potential of such a company and therefore the scale and nature of their R&D.

5. US PARTNERSHIP AND INTERNATIONAL EXAMPLES

XEROX PARC

Companies have to be intellectually well-capitalised to make this work. If you take on a project and know the results you're not going to get anything new. You're not going to - for example - invent the networked environment. When you're holding a hammer, everything looks like a nail.

JON WINET, ARTIST

One of the longest-running continuous artist-in-residence programs is PAIR, the Xerox Palo Alto Research Centre Artist In Residence Program. Established in 1993 by Rich Gold (a researcher at PARC and himself a former artist and musician), the program was originally intended to provide short-term residencies for artists working in traditional forms (such as photography, literature and sculpture) to develop their ideas using technologies such as the WWW, high-speed computers and advanced displays.

PARC is a somewhat unique centre in that it employs scientists in areas as diverse as anthropology and molecular chemistry, along with the skill sets more usually found in Palo Alto such as computing and telecommunications. The organisation is famous as the birthplace of the first workable graphic user interface (GUI), which later became the foundation of both the Apple Macintosh and, later, Microsoft Windows systems for displaying information. PARC began its residency program as a way of beginning a dialogue between artists and scientists 'to make better artists and better scientists', to quote Rich Gold.

[PAIR] engages artists with corporations at the worker level, saying art is important there, and not at the Corporate Foundation level, which is how most corporations engage the arts.

RICH GOLD, XEROX PARC

The PAIR program was originally set up to provide a two month intensive period for artists and scientists to work together, as part of a year's access to PARC facilities by the artists. Fourteen artists have worked at PARC under the program, including Australian Josephine Starrs, and Margaret Crane and Jon Winet have seen their two-month residency grow into a five year involvement with the program which is very active today.

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INTERVAL RESEARCH

Also in Palo Alto is a more traditional research facility that is very secretive in terms of its activities. Managed by David Liddle and owned by Microsoft co-founder Paul Allen, this centre is Interval Research. Interval employs many artists in its research programs, including people as diverse as musician Ailee Willis and new media artist Richard Brown. It is an unashamed attempt to be to the 1990s what Xerox PARC was to the 1970s, and its mission is 'to change the way people think about technology'. Although Interval's core strategy is not so much to place artists in its workplace as to employ them as integral members of the workforce, one of the major programs at Interval is its Computer-Related Design Centre, a collaboration between Interval and the Royal College of Art in London.

LINDA STONE AND MICROSOFT

Microsoft Research's Virtual Worlds group <<http://research.microsoft.com/vwg/>> is the only research group at Microsoft to employ artists and social scientists. Linda Stone is the director of Microsoft Research's Virtual Worlds Group. For over a decade, Stone has been a leader in the effort to create both community and content on the computer. Since joining Microsoft Corporation in December of 1993, she has focused on improving human social interactions in cyberspace. She created and now directs Microsoft's Virtual Worlds team, a joint effort by engineers, artists, and sociologists to develop multi-user, multimedia, technologies for the construction of social environments that really work on a human level. Her group's approach to virtual worlds blends sociology, design and technology with the goal of enhancing net-based relationships, experimenting with technologies that support the use of the Internet as a social medium. Their technologies can be applied to information delivery, social support, learning, commerce, and entertainment. Stone's team is a highly successful example of a product incubation group that blends research and development, creative and technical efforts.

NEW PARTNERSHIPS - ATR (THE ADVANCED TELECOMMUNICATIONS RESEARCH INSTITUTE INTERNATIONAL) JAPAN

One of the basic principles of ATR is for the sophisticated information society of the 21st century to be humanitarian. Their basic and creative telecommunications R&D therefore has a strong bias to humanistic considerations and fresh perspectives. They also believe joint research between artists and engineers provides communication systems with a greater sensitivity.

Australian artist Rodney Berry has recently been invited to be both a guest researcher and artist-in-residence at ATR's Media Integration and Communication Laboratories. During the six months of his visit, he will work with a team of young computer programmers to create a new interactive artwork. The work will consist of a virtual three-dimensional landscape on the computer, which can be seen on a screen and heard through loudspeakers. The audience will be able to move around in this virtual world by moving a joystick or similar device. The virtual environment will be inhabited by creatures,

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which can reproduce and evolve different physical characteristics over a period of time. The sounds of the creatures will also evolve so that when heard through the speakers, it will be seem to be constantly changing organic music.

ATR is broadly concerned with technologies which help facilitate human communication in some way. Artists spend their life finding novel ways to communicate things which could not otherwise be expressed. Because of this, artists often have useful strategies for the kind of 'systems thinking' required where the worlds of meaning and engineering collide. ATR's Media Integration and Communications Laboratories are more specifically concerned with new forms of interactive multimedia. Their interest in the work of Australian artist Rodney Berry lies in his efforts to apply technologies of artificial life to making sound. His future interactive entertainments will employ such techniques to 'grow' features and characters which unfold in an organic manner instead of storing them pre-made on disk. Berry explains this simply by saying it 'saves space on the disk in much the same way as it is easier to carry a bag of seeds than a fully grown forest'.

ATR's Media Integration and Communication Laboratories regularly invites artists to come and work with their engineers. They feel that exposure to the artists' method of working and thinking helps the engineers question their own assumptions and find novel solutions to engineering and design problems. This is especially true when looking for ways of helping people interact with communication and information technologies.

6. A STRONG BASE ON WHICH TO BUILD

All of these projects promote creativity and innovation and assist in the commercialisation of Australia's innovation and creativity. In doing so, they provide enormous cultural benefits by communicating a wider understanding and evaluation of science and technology which, importantly enables a greater international visibility of Australia's cultural and scientific strengths.

In projects such as Tissue Culture and the Arts artists can generate a greater visibility of their work and strengthen the dissemination of information and technology which can then assist with the development of the potential market of 'users'. In a commercial environment, this would help to improve the market competitiveness of the company and its products, both locally and internationally.

As these examples illustrate Australia has a strong foundation of artists undertaking groundbreaking work utilising science and technology which already has international recognition. The Australia Council strongly believes that the development of new partnerships between the arts, science and industry can give our nation the creative edge with which to compete and to become more competitive in the next millennium.

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AUSTRALIA COUNCIL RESEARCH INTO ART AND INDUSTRY PLACEMENTS

In 1998 the Australia Council commissioned research into the potential for the placement of artists in industry, specifically in IT, telecommunications and broadcasting companies. Stage one of the research was intended as an attitudinal study of the environment in which future placements may occur, as well as being a means of identifying companies who may participate. Importantly the research has highlighted the issues that need addressing if the placements are to be successfully negotiated in the future.

Almost all of the companies which supported the idea of placement did so on the basis that it would encourage more creativity and lateral thinking among the people currently working on their R&D projects.

OVERVIEW

Some 111 companies were surveyed through a combination of phone and personal interviews conducted during July and August 1998. The companies interviewed for the research report ranged from very small developers with less than \$2 million in turnover to very large multinationals with global turnover in the tens of billions of dollars, and local operations of \$2.5 billion. The smallest company in terms of numbers of employees had 3 employees in Australia, the largest more than 50 000 and the majority of companies in the IT and telecommunications sectors had between 50-100 employees employed locally. The broadcast and media sector was typified by smaller companies, with between 15-20 employees the norm except for television networks.

Many companies did not want to make available the percentage of the budget spent on R&D activities and those that did were almost apologetic about the low levels. Approximately three quarters of companies either would not disclose the figure or did no R&D locally. Of the remainder, a typical figure was around 2-3 per cent, except for those companies that were dedicated to R&D.

The companies were active in information technology, broadcasting and media production and telecommunications with the information technology category comprising some 86 per cent of the companies surveyed. Among companies included were those that make reproduction technology such as printers and other document-related hardware, software, peripherals; companies operating large computer centres and intelligent storage; and a manufacturer of electronic transaction hardware and software that also offers data warehousing services. Broadcasting and media production made up 14 per cent of the companies surveyed and telecommunications made up 13 per cent of companies surveyed.

The most startling single aspect of the survey was the sharp distinction between the professed personal enthusiasm of the interviewees for the idea of artist placement and their cynicism about being able to implement such a scheme in their own companies. With few exceptions, most interviewees responded enthusiastically to the idea in principle - but from a personal perspective.

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When asked 'do you think there is any scope for this kind of program in [Australian] industry generally?' some 84 per cent of respondents answered 'yes', with a high degree of enthusiasm combined with comments like 'there's terrific scope for this', 'more and more organisations need to find new ways of looking at things' and 'it's not about the technology, it's about applying it creatively'.

Yet, when asked 'do you think your company would be open to involvement in this kind of scheme?' slightly less than 12 per cent of companies said 'yes'. This was the response in companies ranging from software for the defence industry through to database management to professional photographic equipment, and the Council hopes that several placements will be possible in these areas and that a number of significant opportunities exist. However, the report identifies a number of key obstacles which will need to be overcome before this can effectively be achieved.

INHIBITORS AND IDENTIFIED OBSTACLES

Subsequent discussions with companies identified in our research report have revealed two problems that need to be overcome if successful placements are to be organised.

The first of these is 'headcount'. Most of the businesses on the target list are subsidiaries of international companies, and as such are beholden to their overseas head office for the size of their local operations. According to the press and several people in the targeted companies, the IT sector is suffering a downturn this year, and this has been reflected in the discussions on placements in the second stage of the consultancy, in that a common response has been 'we can't increase our headcount'. What these companies are really saying is 'our head office is not prepared to let us fund this kind of program.' In most companies, there is no problem with regard to the provision of facilities – the problem is taking artists into a staff or contract position which might otherwise be directed to sales or marketing.

The second not entirely unrelated problem is that some of the target companies are looking for some kind of economic rationale to present to head office for their involvement in a placement, meaning some kind of economic argument that justifies the allocation of resources to more creative R&D.

The Federal government already provides support for R&D activities because of its belief that they assist in the development of innovative and commercial products - with an emphasis on innovation. While current programs do not address the barriers to placement, they do form a basis for discussion.

In a situation in which the Government is considering the restructure of business taxation, and a reassessment of the programs of assistance currently offered to IT&T companies active in Australia, the economic impact of utilising Australia's creative talents as an impetus to greater innovation should be further explored, and it should be asked whether or not there are ways of encouraging these firms to support contemporary arts practise in new media arts.

The Australia Council is keen to explore these questions further.

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7. MOVING FORWARD - *a series of recommendations*

AUSTRALIA NEEDS TO MAXIMISE AND EXTEND THE USE OF CROSS DISCIPLINARY PARTNERSHIPS FOR ECONOMIC AND CULTURAL BENEFIT

The Australia Council recommends that an extended range of partnerships be promoted through the innovative use of existing government arts, industry and civic enhancement programs. This could be achieved through a new coherent national framework for collaboration between the arts and the sciences. The New Media Arts Fund, working in partnership with government, science and industry through the PMSEIC, would welcome the opportunity to be a central player in the development of such partnerships.

Through the work of its New Media Arts Fund the Australia Council can potentially play an important role in encouraging companies to realise the significant opportunities that exist through an expanded series of placements of artists across industry, science and education.

Stage two of the Council's research project will seek to quantify potential economic or business environment gains from other placements, particularly those related to product development or innovative marketing. This is an area of research which is seen as a priority and which needs to be addressed for further such placements to gain wide acceptance.

The Council has undertaken both a strategic and political assessment of current federal government support for R&D programs and seeks to extend this by undertaking practical work on a range of potential federal government initiatives which can be easily realised using its existing and unique expertise. This may include existing initiatives, such as the Innovation Investment Fund, Pooled Development Funds and the Partnerships for Development and Fixed Term Arrangement (Pfd/FTA) Program which could serve as a possible model for collaborative activities. There are also possibilities of linking artist placements with a range of R&D tax concessions and programs.

The Council strongly recommends that its work be taken forward through a collaboration between the New Media Arts Fund and the Department of Industry, Science and Resources in areas such as management assistance and early stage funding for innovators where researchers and business managers can potentially work together.

Such a program could assist artists working with scientists and technologists as can be illustrated with the work of VisLab, a venture of the University of Sydney, which conducts research into 3D visualisation and other areas of digital media. VisLab already works with a substantial number of artists, including Horst Kiechle (see earlier reference) and uses artists for projects in which visualisation is a key factor, for example in a visual rendering of weather patterns over the Sydney basin, or to create visual representations of topography generated from other complex data sets. It also does commercial work for broadcasters, mining companies and government organisations and currently owns the most powerful computer for 3D work in Australia, as well as several other

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machines that are near state-of-the-art. At present these artists are identified on an ad-hoc basis, as it is not difficult to obtain artists who wish to work at this well-known centre, and the Director, Professor Pailthorpe, is open to the idea of a more structured program and willing to participate in the second stage of the Council's research.

KNOWLEDGE ECONOMY

The Australia Council believes that the arts can greatly contribute to the Government's goals of developing a 'knowledge' economy, of which innovation and ideas are the key drivers. Within an environment in which knowledge is appreciated as a valuable commodity it is the ability to keep one step ahead by pursuing on-going research and development which provides the only competitive advantage. This presentation has attempted to illustrate how artists and 'creative' people can significantly contribute to the innovative process, by providing a differing perspective, attempting to push the technological boundaries, and by strengthening creativity.

Linkages are essential for successful innovation. As with so much of scientific discovery until the last couple of centuries it was the artists who were also the scientists, and the scientists who were artists. Those who provided our society with the greatest 'leaps forward' were often those with a 'renaissance' approach who saw the artistic beauty in new ideas, technologies and techniques, and who immediately understood their potential impact on society. As a society we should explore this methodology anew in order to ensure an on-going source of creativity and innovation.

GOVERNMENT, SCIENTIFIC AND CULTURAL LEADERS PLAY AN ESSENTIAL ROLE

Artists need to be repositioned within sectors such as industry and can be made visible by the active support of the PMSEIC if their potential contribution to R&D is to be fully realised. The Australia Council's research provides a new perspective on the position of the artist within the innovative scientific process, and a formal release of this research at an industry/science event organised through government networks and indeed the significant networks of the *ex-officio* PMSEIC members, could ideally illustrate the Government's leadership and vision in this area. Ideally, the Council would hope that the release be accompanied by a joint statement by both Ministers Minchin and Alston, with a clear link emphasised and a recognition of the artist as being part of the nation's industry.

The National Innovation Summit in February 2000 offers a major opportunity to develop strategies for the future and to reshape Australia's innovation environment to better grasp major growth opportunities. The Australia Council would recommend the active participation of artists whose work in industry or research has led to companies being better able to grasp growth opportunities, and, indeed, it would be beneficial to include selected artists in all key innovation activities where appropriate and possible.

Many of the recommendations in the Stocker report [*Priority Matters*](#) provide opportunities which could be further explored and, in the light of the work being undertaken by artists such as those who

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have been profiled, it would seem reasonable to suggest that many of Stocker's recommendations could be enhanced by the inclusion of the Arts portfolio.

The Australia Council recommends the inclusion of artists in the thinking of government in other priority areas, such as the work being undertaken by the Coordination Committee on Science and Technology (CCST) to address the major issues of cross-portfolio coordination of Commonwealth science and technology activity. When providing a Commonwealth administrative perspective on national science and technology priority setting an extension of this work to include the arts in terms of the contribution artists do and can make in this area, could prove to be extremely profitable. The Australia Council, through its New Media Arts Fund would welcome the opportunity to provide advice and support where possible and/or appropriate.

In addition, basic and applied research in areas within universities where the arts can contribute could be of tremendous assistance, particularly given the difficulties of on-going funding. The current working party of the CCST might consider investigating this suggestion, or a separate working group could be set up.

LEADERSHIP IS NEEDED TO TAKE THE VISION TO INDUSTRY, ACADEMIC/ RESEARCH AND ARTIST COMMUNITIES

The barriers to innovation are not only financial. Greater and more effective communication between the arts, business and scientific communities will also be essential to fully realise the opportunities that may exist. In many cases the lack of understanding of the role art and artists can play in the national innovation system and the opportunities that pose themselves for the arts and sciences to contribute to policy in this area is prevalent and disturbing.

Leadership can be shown to relevant communities through their peak bodies and government leaders can combine with business leaders to become strong advocates for the essential contribution of artists to innovation and creativity. In the same way that the CSIRO has shown leadership through its strong public support of our Artist in Residence program, members of the PMSEIC are similarly able to provide the necessary leadership and the invitation to the Australia Council is a concrete example of this.

As with a great number of projects currently being undertaken by artists, there exist significant commercial opportunities and aspects through which Australia could exploit its creative edge and innovative nature. These are areas in which the PMSEIC could provide not only some guidance and assistance but, more importantly, leadership and encouragement in the business community.

Artists are by their very nature different to most people in industry, though less so in areas of science. It is that difference that brings new perspectives, new approaches, new synergies, new understandings. As a community there is a dire need to work TOGETHER to 'reposition the artist' whilst not diminishing their inherent qualities and abilities. Strong endorsement of the government is essential to effect the necessary cultural understanding across industry.

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8. CONCLUSION

The Australia Council believes that Australian artists have produced a number of outstanding achievements in areas of science and technology which can be built upon in order to further enable our society to compete in the 'knowledge economy' of the twenty first century.

It will take courage, foresight, imagination and commitment to ensure that a ripe environment is both created and maintained for these achievements to both prosper and multiply. This can only be done through partnerships, leadership and mutual respect, and will produce significant rewards which will strengthen both our competitiveness and our society as a maturing nation.

*Examples of the work of artists profiled in this paper
can be found on the website of the
Australia Council, located at:
<http://www.ozco.gov.au/newmediaarts/index.htm>*

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