The Knowledge Nation Task Force: Transformation in Australia.

Barry Jones

AO, FAA, FAHA. FTSE, FRSA, FAIM

When I was first invited to speak at this Conference, I warned you that I might not be an appropriate choice, because I was likely to say things that you did not want to hear. Your organisers undertook to think about what I had said and returned to say that despite everything, they wanted me to proceed.

I was very impressed by a meeting I had some years ago with a senior executive from the Lend Lease Corporation, then its resource director, having previously run the IT division. His only qualification was an apprenticeship in carpentry. (That was also the qualification of the founder of a well-known religion). But, the executive said, he had been exceptionally lucky because the carpenter he worked with took a non-instrumental view. He said, 'This job is essentially about problem solving - about asking questions, finding answers and working out solutions - just like a doctor. It's only then that wood and saws and hammers and nails come into it'. The apprentice then went on to carpentry, quantity surveying, calculating, IT and resource management, without having gained additional paper qualifications.

I would like to think that with the current emphasis on 'core competencies' in TAFE that this broad approach was still possible.

My text is drawn from the poet Roy Campbell and was once used as advice for thesis writers at Melbourne University. The message is: it is one thing to get the methodology and the scholarly apparatus right, but even more important to have something to deliver.

'I see the snaffle and the bridle – but where’s the bloody horse?'

Just as business is risk averse, many Australian students appear to be complexity averse, backing away from tough subjects, physics, chemistry, mathematics, languages. The numbers of Science graduates have fallen sharply below the OECD average. When we deduct the numbers of Science graduates who have come from South East Asia, the resulting figure is strikingly lower.
At a time when our tertiary education is becoming increasingly instrumental, the UK experience is going in the other direction: classics, philosophy, languages, history are all on the increase, right across the board.

The major reason for the slide of the Australian dollar to around 50 cents US is because we are perceived as having an economy based on the exploitation of raw materials, that is, an Old Economy. The falling dollar was very good for traditional exports (a 25% increase in 2000, the best figure since 1979) and adds to a sense of reinforcement.

When *The Economist* ran a recent feature on Australia, it was dismissive of the dichotomy between Old and New Economies - and it gave a striking example (if you will excuse the pun): the firm of Mick's Whips in the Northern Territory, an Old Economy product which has gained a significant international niche market by creating its own website, a New Economy technique. But Mick's Whips and a shipping company in Fremantle were the only examples *The Economist* gave of Australian manufacturers.

*The Economist* might well have pointed out that the mining industry is a major producer not only of minerals but of information products.

Australia is going through a transitional period, moving away, rather slowly, from the Old Economy towards the New Economy. This transition has significant implications for education and training, nowhere more than in TAFE.

<table>
<thead>
<tr>
<th>Old Economy</th>
<th>New Economy</th>
</tr>
</thead>
<tbody>
<tr>
<td>Hand</td>
<td>Head</td>
</tr>
<tr>
<td>Material - resource based</td>
<td>Dematerialised</td>
</tr>
<tr>
<td>Physical movement</td>
<td>Transmission of data</td>
</tr>
<tr>
<td>Resources consumed</td>
<td>Data not consumed</td>
</tr>
<tr>
<td>Energy waste = profit</td>
<td>Energy efficiency = profit</td>
</tr>
<tr>
<td>Generic goods (woodchips, coal, wool)</td>
<td>Brand name services</td>
</tr>
<tr>
<td>Tonnes</td>
<td>Grammes</td>
</tr>
<tr>
<td>Price is central</td>
<td>Quality is central</td>
</tr>
<tr>
<td>Declining prices</td>
<td>Rising prices</td>
</tr>
<tr>
<td>Declining market</td>
<td>Rising market</td>
</tr>
<tr>
<td>Declining employment</td>
<td>Rising employment</td>
</tr>
<tr>
<td>Research significant</td>
<td>Research central</td>
</tr>
<tr>
<td>Was&gt;&gt;&gt;Is</td>
<td>Is&gt;&gt;&gt;Will Be</td>
</tr>
<tr>
<td>Environmentally damaging</td>
<td>Environmentally benign</td>
</tr>
<tr>
<td>Familiar</td>
<td>Unfamiliar</td>
</tr>
<tr>
<td>Instrumental</td>
<td>Non-instrumental</td>
</tr>
<tr>
<td>Simple processes</td>
<td>Complex processes</td>
</tr>
<tr>
<td>Site-specific</td>
<td>Non site-specific</td>
</tr>
</tbody>
</table>
It is in this contest that I take up the advertised theme of my talk – about the Knowledge Nation Task Force.

A Knowledge Nation (sometimes called an 'Information Society') is one in which the largest section of the labour force is employed in the processing of information, broadly defined, which has the capacity to generate Knowledge Industries, and in which the products of research are directly applied in economic and social activity - health, environment, agriculture, mining and manufacturing, construction and infrastructure, transport, leisure activities, education, media and information.

Peter Drucker coined the term ‘knowledge economy’ in 1969.

Kim Beazley appointed the Knowledge Nation Task Force last year. I was made Chair, Martyn Evans, MP, Shadow Minister for Science and Resources, the Deputy. The co-ordinator is Dr Dennis Glover, from Kim Beazley's office - a PhD in History from King's College Cambridge, and an expert on the Levellers (the radicals in the English Civil War).

Members include Shadow Ministers - Carmen Lawrence, Stephen Smith and Kate Lundy, MPs Craig Emerson and Kevin Rudd, and the Victorian Treasurer John Brumby. Others include Clem Doherty, Evan Thornley (an expat from Looksmart in California), Cathy Zoi, and Professors Jane Marceau, Mairead Brown, Bob Williamson and Peter Dixon.

Valuable contributions have been made by Prof. Peter Doherty, our expatriate Nobel Prize winner, Prof. David Yencken, author of *Resetting the Compass*, Prof. Peter Karmel, Prof. Don Lamberton, Prof. Hugh Stretton and several others.

At the second meeting we created working groups to address specific problem areas:

(a) **Defining and measuring the Knowledge Nation.** How do we conduct a national inventory (or cadastre) of Australia's knowledge capacity? How do we encourage interaction between all sectors and a holistic approach to creating a Knowledge Nation?

(b) **Opportunities for all.** Ensuring all Australians can participate in and share the benefits of the Knowledge Nation. Preventing the emergence of a digital divide.
(c) **Boosting 'new economy' industries and enabling industries, including IT&T, education, health, nanotechnology, supercomputing and biotechnology.** What infrastructure improvements do we need? How do we create online and active government (including its role as an owner operator, regulator and consumer)?

(d) **Improving Australia's manufacturing and service industries.** Developing an innovation culture and improving our R&D performance. Is it a case of what R&D rather than how much R&D? Is it predominantly a tax policy or a culture and management problem?

(e) **Meeting Australia’s education and training needs.** What do we need to do to create synergy in our education and training system and improve our schools, universities, TAFE, industry training and lifelong learning? How do we meet critical skill shortages? What is the balance between science, maths, engineering and the humanities?

(f) **The environment as an opportunity.**

(g) **Reconciling opposites.** How do we overcome the key "irreconcilables", such as how to:

- Gain public understanding of biotechnology research in the face of ethical considerations;

Cut greenhouse emissions and become more energy efficient whilst maintaining employment in extractive industries;

Meet the cost of becoming a Knowledge Nation in the face of budget constraints and,

- Help communities threatened by change adjust and benefit.

The 'Knowledge Nation' is a unified concept, a new paradigm, which links together:

- Education – schools, universities and TAFES
- Lifelong learning and 'the Third Age'
- Training
- Research - ARC, NH&MRC, CSIRO, AIMS, ANSTO, the CRCs, B of M.
- Innovation
- Information bases - including libraries and museums
- Economic base
- Manufacturing
- Agriculture
- Mining
- Transport
- Trade and Commerce
- Banking
- Communications/Media (notably the ABC)
- Entertainment, the arts and leisure
- Time/use value - rethinking the value of life outside work
- Technology
- Human Rights
- Welfare
- Health
- Environment
- Resource auditing (a **Cadastre**).

The complex interactions between the elements of the Knowledge Nation

The common element is the ability to use information/knowledge to transform society, the economy and the environment.

Information or Knowledge workers have been the largest Australian employment sector since 1966. They now number about 40 per cent of workers, far more than manufacturing, construction, agriculture and mining combined. They include people who create, manipulate, store, process and transfer information, working with symbols, or symbolic
Members of the Taskforce agree that Australia is already a Knowledge Nation, or Information Society/Economy, but with some passive, immature, underperforming elements which could be overcome by improving linkages.

We have invested in a very strong infrastructure but the results are often disappointing. It is as if we had trained pilots for the air force, but had no planes for them to fly, or trained teachers, doctors and nurses but forgot about schools and hospitals and the resources to run them well. Universities, chronically starved of funds, are forced to get out the begging bowl or rely on short term contract work, a situation which may transform them from being communities of scholars to being trading corporations, moving away from long term research which extends the bounds of knowledge and may have valuable but unexpected effects, towards sponsored product oriented research, limited by the sponsor's business aims.

The popular image of Australia as essentially a primary industries economy is misleading and counterproductive. Agriculture and mining account for only 8.3% of our Gross Domestic product and 5.6% of the labour force. Our biggest export earner, coal, contributes $10 billion to the GDP but employs only 25,000 people.

Australia is the most urbanised nation on earth with 66% of its population in five large cities. Service employment - the main characteristic of city life - accounts for 73% of employment, of which information workers are the largest sector, about 40% of all workers. And yet information workers make a relatively small contribution to our exports.

If Australia continues to act like a colonial economy, simply providing raw materials in high volume and at low cost to more sophisticated economies overseas, as commodity prices fall, we run the risk of losing our economic independence, as 'price takers' rather than 'price makers'.

Australia suffers from a serious 'inventory problem', the lack of an inventory of internationally recognised brand name goods and services for which there is high and rising demand. In world economy rankings, Australia is No. 14, but runs the risk of being overtaken by nations with far smaller populations which offer high value added products.
We have to overcome the crippling mindset which repeats the mantra: 'But Australia is only a small economy’. Tell that to the Swedes, the Dutch, the Finns and the Israelis!

The Knowledge Nation concept emphasises linkages. Having a comprehensive inventory (or cadastre) of national strengths and weaknesses would help us to understand how interdependent all sectors of our economy are. We face very serious environmental problems, made worse by a stubborn refusal to examine the extent of environmental damage, confusing long term and short term issues and exaggerating the differences between the advocates of 'green' issues and the agricultural and mining industries. It is important to emphasise how much they have in common. The economy is a wholly owned subsidiary of the environment. The environment is the totality of all there is in our world - the planet itself, soil, air, water, biota and minerals.

Our rivers are in crisis, and desertification threatens our agricultural base. Tackling the problems of water use, salinity and desertification will require a huge public investment and an enormous contribution from CSIRO, the Universities and the Cooperative Research Centres (CRCs). In their current weakened state they are unable to make an adequate contribution to tackling this problem. We have a very poor knowledge base about the effects of irrigation, or the state of our wetlands.

Australia cannot just play the game of 'catch up'. As Dr Robin Batterham, Chief Scientist for the Australian Government, wrote in his recent report The Chance to Change, we cannot just be 'fast followers', asserting that if we redouble our efforts in a decade we can be where the Koreans were 20 years ago. We must leap frog well into the 21st century.

A striking illustration of policy failure due to the lack of an adequate knowledge base is found in the Great Barrier Reef region. The term 'by-catch' is used to describe the degree of wastage in fishing when, say, tuna boats throw back dead and dying fish caught in draglines. In some areas it may be as much as 80% of tonnage caught. In the Great Barrier Reef, the 'by-catch' includes natural predators of the crown of thorns starfish. The negatives associated with our failure to have an inventory of fishing in the region are the destruction of many species of fish, exposing the Reef to infestation, and the problem of cleaning up fish carcasses from beaches. So our failure to have an adequate inventory damages not only Tourism, but the fishing industry as well.

Universities

Many of Australia's senior biotechnologists are now working in California - probably more than are working here. In effect, we have provided a free
gift to California of human resources that we capable of educating at the highest international level, but not capable of creating career structures so that Australia could use them. (If California was an independent nation it would have the world's seventh largest economy).

Educating overseas students makes a major contribution to Australia's foreign earnings, and our universities could not survive without the income.

One third of Australia's engineering students are from Asia. When they return to Singapore, Malaysia or Thailand they are often able to make a far greater contribution, relatively, to transforming their national economies and society than their Australian counterparts do here. Our culture responds to short term stimuli - there is little evidence of generational thinking.

One self-imposed limitation in our political culture is treating tertiary education (especially universities) as if it fulfilled elitist aspirations, and was remote from mainstream Australia. We must be courageous in rejecting this absurdity.

Very few of our 19,000,000 people (mostly people living remotely) are more than one degree of separation away from universities and their intellectual contribution to national life.

- our health standards through the training of doctors, dentists, nurses and other health care professionals,
- our education at all levels,
- aviation safety, the design of houses, bridges and public buildings, of highways, the provision of water supply, sewerage services and electricity,
- research in communications - telephones, television and radio
- research in agriculture, forestry and fishing by scientists in the CSIRO and the Bureau of Meteorology,
- highly specialised research in geology and remote sensing for the mining industry,
- the protection of our environment, rivers, soil, animals and plants, and the oceans that surround us,
- maintaining and improving our legal and political systems,
- services such as banking, insurance and economic analysis.

Crippled, demoralised universities - like a crippled, demoralised ABC - weaken the national interest and affect the lives of millions of Australia, many of whom may not realise their degree of dependence.

Between 1980 and 2000, full time equivalent university enrolments increased by 50%, staff increased by only 6% and the Commonwealth
contribution fell by 3%, making universities increasingly dependent on fees from overseas students.

‘Dematerialisation’.

Unpalatable though it might seem, Australia has to face up to and understand the concept of ‘dematerialisation’. As far back as 1988, the OECD was drawing attention to the phenomenon of 'dematerialisation', the prospect that energy, hardware and materials would be a declining share of world trade, and the terms 'Factor Four' and ‘Factor Ten’ were used. Factor Four was a projection that the use of fossil energy would drop by 75% by 2030 and Factor Ten that per capita material requirements would fall by 90% by 2050.

Neither concept proposed a reduction in quality of life - the suggestion was that increased efficiency would provide the same outputs with dramatically reduced inputs. Use of e-mail - in distinction to conventional letter delivery by post - is an illustration of 'dematerialisation'. So is the WWW - a library with billions of pages which can be accessed from a hand held terminal. The Google search engine claims access to 1,346,966,000 pages, equal to 54 kilometres of shelving (assuming 25,000 pages per metre).

The ALP's 2000 National Conference in Hobart was an (almost) paperless meeting, with delegates working from monitors.

Europe understands the changing economic base and this is demonstrated by its strong support of the Kyoto Greenhouse protocol. The United States and Australia are going in a different direction.

This sounds like a nightmare scenario to the Australian Government which pursues Old Economy goals with Churchillian doggedness. It rejected energy efficiency as being against the national interest (aka the coal industry) and embraced energy waste - witness its vehement campaign to modify Kyoto Greenhouse gas targets.

Privatisation - The Enterprise Universities (not public, not private)

The privatisation of research has led to Governments treating CSIRO and the universities as trading corporations and moving tertiary education towards an increasing emphasis on training and commercial goals. Australia cannot pursue the goal of an innovation culture ('Smart Australia') and simultaneously cut R & D expenditure. Basic research is under major threat. Universities have become increasingly instrumental, less speculative - imposing self limitation on the nation. Their infrastructure is often crumbling. Humanities are down, computer and business studies up. (Monash University indicates that only 9% of its activity is in the Humanities - 30% in computer studies,
Science vocations are well down - as much as 20% on 1990. Australia has huge policy deficits - no Science and Technology Policy (or Health, or Education) - only Budgetary strategies. Queensland is an anomaly, experiencing a remarkable growth in medical and biotech research, assisted by a number of enterprising Cooperative Research Centres (CRCs).

**National Inventory - State of the Nation Report (Cadastre).**

Some states have effective environmental registers - others do not. Creating national inventories of water, soil, wetlands, fishing, grazing areas, forests must be in the highest priorities for the Knowledge Nation - and seen as an essential investment, not a cost.

A central pre-condition for being an effective Knowledge Nation is having an adequate knowledge base, which can then form the basis of public debate, community understanding, policy formulation and appropriate action by Commonwealth, State and Territory Governments.

The Commonwealth Census, conducted every five years, provides vital information, gained from individual and family returns, about age and skill distribution, housing and some other social indicators.

The Australian Bureau of Statistics also publishes some important papers with implications for the environment, for example, Water Account for Australia - ABS 4610.0 and Population Projections 1997-2051 - ABS 3222.0.

However, we lack much comprehensive, publicly available documentation about the physical state of the nation -

- river flows
- state of wetlands
- loss of tree cover
- extent of desertification
- extent of land degradation
- extent of salination
- fishing stocks- especially overfishing and the extent of 'by-catch'
- loss of biodiversity
- contamination of coasts, estuaries and waterways.

Much of this material has been collected by State governments or by Commonwealth authorities but the availability and quality of information is extremely variable. Some Governments are extremely systematic in collecting data - others are not, so that is difficult to make well informed decisions, for example, about the viability of the fishing industry, rice and cotton growing. Political sensitivity inhibits frank disclosure.
We have the technical competence, for example with remote sensing by satellite, to conduct comprehensive surveys, to apply uniform standards and to encourage all Governments to make this information accessible online, or in other published forms, generally as a public good, but charging consumers where this is justifiable. Material of extraordinary quality is held in some State offices already, but is not released for fear that the reality will generate controversy. So the truth is locked away.

The term Cadastre, first used in the Doomsday Book of William the Conqueror, could be revived as a means of distinguishing comprehensive State of the Nation reports, which apply uniform standards and help make the concept of a Knowledge Nation a reality. The cost would be modest (80% of the work is already done): the benefit to the nation would be enormous. Creating and updating the Cadastre should be on the agenda for meetings of COAG, with emphasis on sharing knowledge, sharing costs and sharing benefits, for the medium and long term.

We must encourage interaction between all sectors and a holistic approach to creating a Knowledge Nation. We need to adopt a National Information Policy, ensuring access and equity in securing knowledge and to guarantee that information is available as a public good, outside commercial exploitation. Strengthening the Australian Broadcasting Corporation, the Bureau of Meteorology and CSIRO must be in the highest priorities for a Knowledge Nation.

**Sky blue research**

Australia itself was an unexpected, serendipitous, by-product of fundamental research - Cook's expedition in 1769 to Tahiti to observe the transit of Venus, taking botanists and artists as well as astronomers and cartographers for exploration on the way back. From the very beginning there were four elements in the development of New Holland/ New South Wales (i.e. Australia):

- **strategic** - keeping the French out and extending the imperial reach
- **economic** - raw materials (flax, timber, wool)
- **social** - a place to warehouse convicts (having the lost the US at a time of an urban crime wave)
- **scientific** - a contribution to knowledge from another New World (the first since Columbus)