EMERGING SKILLS: 2020 AND BEYOND

- WHAT WILL THEY BE AND AS A NATION HOW ARE WE PLACED?

One of the challenges facing both business and post-compulsory education and training providers is to identify what are the skills sets and knowledge sets which will be relevant in the years ahead and how best to meet these.

Increasing commercial pressures will inevitably speed the time-to-market of emerging technologies. In a globally competitive marketplace there is constant pressure to compress the lag between demand for and supply of appropriately educated and trained staff. Business and education providers need to put in place mechanisms to ensure we anticipate our needs and know how to meet them.

B-HERT hosted a one day summit to address these issues.

Recently there has been considerable discussion about the growing problem of skill shortages. Such shortages cover an array of industry sectors. However, what is not being discussed is the type of skills the Australian workforce will need in the coming decades and the nature of the education and training which will be needed to support those needs.

Australia is increasingly a knowledge-based economy. Sectors such as elaborately transformed manufacturing, ICT, engineering, mining, agriculture, the sciences and the professions will be the enablers in our pursuit of a high performing knowledge-based economy.

Issues considered at the Emerging Skills Summit included:

- What trends in skills gaps exist today in Australia and how are they being rectified?
- How are the Higher Education and Vocational Education & Training sectors positioning themselves to meet future shifts in skill requirements?
- How can business and industry communicate to education providers what their market needs are?
- Should Creativity be a recognised discipline much the same as Knowledge Management now is?
- How do you build a demand driven culture where organisations are constantly seeking change rather than waiting to have change forced upon them?
- How will the ageing of the Australian workforce be addressed and what are the implications for lifelong learning?
- Is the trend towards generic degrees coupled with vocational skills, or double degrees the right option?
- How do we predict future skills trends especially for future business leaders and those wishing to embark on a career incorporating innovation, entrepreneurship and business development?

The Summit was an opportunity to canvass the opinions and ideas of thought leaders from a number of areas of expertise - business, industry, higher education, vocational education and training, research, graduate employers and the professions. This volume includes summaries and excerpts from presentations at the Summit.
The last decade has brought significant change for most Australian managers. The economic rise of China and India and the consequent growth in offshoring has changed the executive landscape. The continuing shift to services in the economy and the greater focus on people performance rather than asset performance has changed the workplace. The ageing workforce has become a reality which executives must now address. The rise of shareholder value as the primary measure of company performance and the growing influence of the corporate governance movement have had a dramatic impact on the way executives think and act. The years to 2020 promise further change (Exhibit 1 and 2). With it will come a new agenda for executive education and training.

THE CHANGING WORLD
Over the next 15 years, we will begin to see three different generations in the workplace at the same time, each with very different needs and aspirations. Baby Boomers will no longer dominate and Generations X and Y will play a much larger role. Managers will be expected to manage a multi-generational workforce and acquire generation specific leadership and management skills including managing a generation of older workers who will not retire in the traditional manner.

Globally, executives will have to come to grips with a world economy increasingly shaped by the emergence of China and India as major powers and with an Asia fully recovered from the 1997 crash. They will face global labour markets and complex environments generated by offshoring and other multi-country strategies.

As a result, executives will need more sophisticated strategies to engage in the global market. They will travel frequently and spend a greater proportion of their careers outside Australia. A sound understanding of offshoring, supply chain management and diverse workforces will be vital. Managers will also need to give serious consideration to developing strong language and inter-cultural skills.

THE CHANGING WORKPLACE
The workplace will increasingly focus on the performance of people as a core company asset. Models of flexible working will continue to evolve in response to the changing needs of Baby Boomers and the preferences of Generation Y. Greater attention will be given to measuring the performance of people, not just physical and financial assets, and also to developing new techniques for improving performance. Problem solving and creativity skills will become increasingly important.

Globally, executives will have to come to grips with a world economy increasingly shaped by the emergence of China and India as major powers and with an Asia fully recovered from the 1997 crash.

Executives will need to master a range of new management tools and will be expected to operate effectively in a highly dynamic environment. They will find themselves assessed on a new range of metrics and will rely much more on output measures to assess their staff. They will require new skills to create more flexible work environments that better accommodate the needs of their employees, including greater numbers of contractors and part-time workers.

THE CHANGING MINDSET
In the next decade or so, there will be a shift away from a dominant shareholder value perspective and towards a wider stakeholder view. This will create closer scrutiny of the way in which companies and executives behave.

Executives will need to move to a ‘community of stakeholders’ view of performance that enables them to understand and balance competing and conflicting interests.

The predominance of the generalist is likely to decline, and will be replaced by a greater emphasis on genuine subject expertise in senior roles. Executives will need to learn how to build and maintain personal expertise in their field, while building and leading teams of experts.

Exhibit 1

A VISION FOR 2020

The Changing World
- Drastically shorter working life
- Retirement of all workers
- Baby Boomers in a new generation
- Three generations in the workplace
- Emergence of low cost economies
- Offshoring of low cost economies
- Ageing in Asia

The Changing Workplace
- Focus on external collaboration and stakeholder engagement
- Work-life balance
- Recruitment of young talent
- Managing the labor force
- Enhancing the customer experience
- Enhancing the customer experience
- Enhancing the customer experience
- Enhancing the customer experience

The Changing Mindset
- Obsolescence will increase
- Testing all combinations
- Grassroots democracy
- Cotton on management
- Managing stakeholder relationships

Exhibit 2

JON NICHOLSON,
Senior Vice President,
Boston Consulting Group
THE AGENDA FOR EDUCATORS

The emerging challenges for executives will set a new agenda for educators and Human Resources Directors. Although requirements between companies, individuals and roles will vary widely, a number of new areas will arise for training and development (Exhibit 3).

Exhibit 3

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<thead>
<tr>
<th>EXECUTIVE DEVELOPMENT NEEDS</th>
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<tr>
<td>The Landscape</td>
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<td>The Changing World</td>
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<td>The Changing Mindset</td>
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The years to 2020 will see a substantial new agenda unfold for managers and executives. They will need to respond to major changes in their external environment, globally and domestically, as well as changes in the workplace and changing expectations of their role and the way their performance is assessed.

The new executive agenda will place responsibility on educators to develop the next generation of executives, and up-skill the current generation.

*This is the executive summary from a report prepared by Jon Nicholson

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**Lucky Country, perhaps, but not the creative country; forget the MBA, get an MFA (Master of Fine Arts)**

In today's economy, where most goods and services are commoditized and where the battleground in the marketplace is about differentiation in the hearts and minds of the consumer, US corporations are demanding a new breed of executive: one with an understanding and knowledge of creativity and how the creative process works. Globalization demands skills in excess of technical or even business systems thinking. It calls for concepts in systems, design, affective response, and human factors: the domain of creative thinking, a field developed over the past seven decades.

The Harvard Business Review's "Breakthrough Ideas for 2004" February issue presents The Creativity Index, an indicator of a country's ability to achieve growth through the use of technology, talent, and tolerance. The Index reveals Australia did not place even among the top 15 countries in the world. Daniel H Pink's accompanying article, entitled "The MFA is the New MBA," offers some important clues as to why Australia doesn't rate as a creative country.

US corporations now see business degrees as second in importance to arts degrees. 61% of McKinsey's new hires are MFA as opposed to MBA. MBAs in America are seen as secondary degrees that provide excellent number crunchers and financial modellers—but countries such as India can provide those in abundance at $US800 per month.

**Two facts**: One: All top-ten business universities in the US include formal courses in studies of applied creativity and innovation. Two: It is harder to get into the graduate program at the UCLA Department of Art than into Harvard Business School.

Based on research recently completed in Australia, there are only three Business Management Schools in the US offering any form of graduate study in creativity and innovation. Indeed, a professor at one business school was heard to remark, "We take these rich creative young talents and in three or four years have squeezed every bit of creativity out of them..." Off-handed as this sentiment was at the time, it contains more than an element of truth.
Australia has been well served for over 75 years by one of the world's leading scientific research organisations, the Commonwealth Scientific and Industrial Research Organisation (CSIRO). It is a federally funded but internationally respected organisation – with a poor track record of commercial success. A retired chairman of the Dupont Center of Excellence at the 2002 American Creativity Association national conference summed up when he said, "Australian scientists are some of the best in the world, absolutely no doubt. But they couldn't sell water to Arabs in the desert."

**BUSINESS, ART, AND POLITICS**

The prevailing view among Australian business leaders is an old one – that creativity is the domain of the artist.

Robyn Nevin, Artistic Director, the Sydney Theatre Company captured this attitude in her Australia Day Speech 2004 when she reflected on the "unease of Australians towards a softer appreciation of things. Australians have traditionally been uneasy around overt expression of emotion, around sensitive people expressing that sensitivity." Call it Anglo-Saxon reticence – or the need to show only the famous "game face" of business.

*In Australia, by contrast, a good idea is initially greeted with total skepticism.*

The Romans used to call their sporting heroes Gladiators, and they fought to the death. The shareholders in the coliseum gestured to the Emperor with the public "thumbs-up" (or down) to signal whether fighters would live to do battle again – very similar to the circumstances in which the modern CEO must make innovative decisions and do planning. The result was and is always based on whim rather than actual performance.

The problem is the metaphor. Leaders of industry are very rarely sporting heroes. Sporting heroes are a unique minority, with a short lifespan normally based on youth and physical attributes no longer within grasp of 95% of the population or senior management in their mid-40s to 50s. Their heroic images live on and swell as their deeds and actions are recalled over and over again for commercial celebrity purposes. The motivational speaker industry is littered with sporting heroes who relate nothing more than anecdotal accounts of their former days of glory—clichés used to suggest that any one of us can learn to become such a champion. There is no need for reflection or intellectual analysis. All we need, as Nike has it, is to "Just do it."

Applied creativity and innovation facilitation do call for immersion in experiential processes just like that of the artist. However, the results of this process are built on disciplined observation and reflection with a strong emphasis on interpretation of the personal creative insight – rather than the unknowable insights of a distant champion. Both share a mental discipline, but, contrary to popular opinion, the artistic path is the far more knowable and attainable route.

**CREATIVITY ACROSS CULTURES**

In the US, if you express a worthy creative idea, then the American cultural value system dictates that it is embraced with enthusiasm. US corporations have now realized that those best trained to express their emotions are practising artists because they provide a rich design resource for product or service differentiation. By contrast, Australian companies’ only real association with the arts has been through sponsorship, not education or appropriation. Sponsorship of the arts in Australia allows corporates to network with the art elites and offer clients access to first-night openings or celebrations. But neither arts theory nor the skills and knowledge base is pursued for its relevance to industry.

Conversely, process and content are considered an artist’s-only privilege and domain. Artists see sponsorship of this privilege by the coffers of business as a necessary evil to stoke their wheels of production. Arts content is not available for commercial consideration, nor should it be. It is what it is. The artistic inward journey to discover their own creative processes has been torturous, unsystematic, and highly self-reflective. From an artist’s perspective, corporations are heartless, existing only for commercial as opposed to personal fulfilment or emotional "profit." (See "The Office" BBC series for confirmation.)

Following this inherent cultural bias, rather than use arts as their inspirational models for creativity, corporate leaders exhort their senior managers to embark instead on a quest to succeed and find "new" heights in performance by learning from the peak-performance examples of our great Australian sporting heroes. For the corporate conservative, a sporting champion and his mindset represent the most popular and least threatening metaphor for commercial innovation and creativity. And indeed, relative to its population, Australia is the leading producer of Olympic-medal winners. [fn: The Atlantic, July/August 04]
The question has to be asked: If we spend comparatively larger sums on research and development, why do we not rate in the top 15 creative countries in the world?

Over the past 12 months, creativity and innovation within Australian business has become a hot topic. As a result, Australian corporations are rushing to employ people with the word "innovation" in their titles. There is little doubt innovation is seen by employers as a pseudonym for "entrepreneurship" – a natural reversion to traditional business-management school background.

What is important here is that innovation is recognized as a new necessity in business. Yet few leaders have the background to recognize or support it as an operational goal.

There is in the US, on the other hand, eagerness by senior management to embrace, explore, and experience the opportunities and processes that a formal arts and applied creative education might offer in their search for better results. As an early solution, the Singapore government has over the last couple of years spent substantial sums on developing and introducing creativity courses into the high school and tertiary-level curriculum.

Australia has a history of being inventive but failing to capitalise on the invention. The black-box flight recorder, the orbital engine, gene shears technology, and most recently, cyber technology are all inventions Australian can justly be proud of. The old argument that capital is scarce and the market small is no longer acceptable excuse for inability to exploit the commercial potential of these ground-breaking inventions.

In his book the Rise of the Creative Classes, Professor Richard Florida argues that "venture capital dollars flow internationally into towns and places that have a bigger and better stock of talented and creative people."

Florida suggests that the strong economies of the future will be those that concentrate "not on developing cost-effective centres for manufacturing or basic business processes. Rather they will be countries that are able to attract creative people that come up with next-generation products and business processes as a result."

Under the Harvard Creativity Index, Netherlands, Ireland and Greece rate in the top 15 creative countries in the world. Australia, rated below the top 15, spends 0.8% of its annual budget on research and development, whereas Ireland and Greece spend only 0.36%. Only the Netherlands, ranked fourth worldwide behind Sweden, the US, and Finland, spends more than Australia at 0.87% of its national budget.

The question has to be asked: If we spend comparatively larger sums on research and development, why do we not rate in the top 15 creative countries in the world? Why do we not capitalise on our R & D investment? Is there something basic we need to discover and confront about our national creativity and its potential?

Only under industry pressure will universities be motivated to act to make creativity a recognized program of study and practice.

IMPLEMENTATION

Australian business management is imbued with a sense of research and development but it lacks the skills, knowledge and confidence to work commercially creatively and innovatively. To change this mindset, senior corporate executives need to put marketplace demands on tertiary institutions to provide formal courses in Creativity and Innovation. Only under industry pressure will universities be motivated to act to make creativity a recognized program of study and practice.

Once universities oblige, business can then gain vital access to the ever-changing, fast-moving knowledge and processes of creativity. They will be able to engage in informed exchanges with the arts industry; employ arts graduates at senior management levels, and through this process actually begin to perceive creativity not as an aesthetic proposition alone but as a complete design system. Put to work intelligently, this system offers the potential for product, service, or organisational differential as a matter of practice. The creative advantage can now be trained and deployed as a national resource to keep competitive pace in the globalization of business and as a carrier of civilization.

Robert Lutz, chairman of General Motors, summed up the case for creativity when he said, "I see us being in the art business. Art, entertainment, and mobile sculpture, which coincidently also happens to provide transportation."
The title of this paper – World Class Skills for World Class Industries – the way forward - is a none too subtle reminder that skilling does not exist for its own sake, but to support competitive industry. It is an important point to make because skilling is an enormous investment – for both the public and private sectors – and it is increasingly being recognised as the factor which significantly contributes to our current and future prosperity.

So, to understand the future role of skilling we need to start from an understanding of the future as seen by industry.

The Australian Industry Group represents around 10,000 companies across a range of industries including manufacturing, construction, automotive, mining, transport, IT and labour hire. We pride ourselves in our close relationship with our membership and we draw heavily on the views of our members to help shape our strong research activities.

In recent months we have been holding forums with our members around the country discussing the future of manufacturing because while manufacturing is just one of the sectors from which our membership is drawn it is certainly one of the biggest – and arguably the sector facing the most immediate challenges.

The very powerful messages we have gathered from this work are highly relevant to the broader economy.

MANUFACTURING FUTURES

Manufacturing companies operate in the most competitive market in the world. In this market, industrialized countries are competing on high value, innovative products, ground breaking-processes and management tools.

If you need any convincing about the dynamism of the sector you need look no further than the developments in recent times that the sector is grappling with.

These include:

• The impact of a stronger Australian currency on our global competitiveness

• The emergence of China as a global manufacturer and the impact on our export volumes

• The drift of Australian companies to outsource overseas and to move investments off shore

• The increased import penetration into Australian manufacturing sales

• The intensified squeeze on selling prices and margins

• Meeting environmental standards

• Skill shortages in key industries.

The industrialised world is no longer just watching the transformation of rapidly expanding low cost economies; it is clearly feeling the bite. For Australian manufacturers, China is a major force.

*The Economist* recently commented that global inflation, interest rates, bond yields, house prices, wages, profits and commodity prices are now being increasingly driven by decisions made in China. They also argue that this situation will continue for a couple more decades: that the impact will be felt to 2020 and beyond.

As a side issue; Every-one talks about the wage levels in China. Their average production worker earns around $1200 per annum, equivalent to the average workers compensation costs of one Australian worker. Clearly we’re never going to be looking at parity of wage levels or competing in low cost goods with high labour content.

China is having a huge impact on Australian industry and the official push for growth is not going to let up. The pressure from the rural areas for greater wealth is unrelenting. But also the demographics of China are driving this growth imperative. As a senior Chinese official said ‘we have to get rich before we get old’ and that means it’s a race until around 2020 when some of China’s demographic pressures will really start to be felt.

China’s accelerating export growth is amazing. Over the last 24 years they’ve grown from 1% of world trade to 6.5%. Expectations are that this will increase to 15% by 2015 and 20% by 2020.

The transformation underway in the Chinese economy, while providing Australian manufacturers with many opportunities, has also presented some major challenges.

HOW ARE COMPANIES RESPONDING TO THE CHALLENGES?

Australian companies are actively pursuing a range of strategies to respond to global competition:

• Many companies are seeking to trim costs through the use of lean manufacturing, process improvement and other efficiency measures

• There has been an increased focus on new technology investment and

• Skill development is a strategy companies are using to enhance productivity and to help overcome skill shortages.
While these strategies help to lower costs, remaining competitive also requires companies to be innovative and look to grow markets either in Australia or overseas.

**WORLD CLASS SKILLS FOR WORLD CLASS INDUSTRIES PROJECT**

Early in 2005 the Australian Industry Group commenced the **World Class Skills for World Class Industries project**, with the support of Australian Government and the Victorian and Queensland Governments. This project is an update and extension of AiGroup’s 1998 Training to Compete report which some of you may be familiar with.

The current project – due for completion early next year – will provide employers’ perspectives on skilling in Australia. It will analyse the current state of skilling in Australia, develop an understanding of future skilling needs and develop a map of strategic policies which would positively impact on skilling.

It will explore skills shortages, demographic changes, the changing nature of work, economic forces and the changing relationship between the training sector and industry.

The project is based on a number of information-gathering activities including industry round tables and the results of a survey of over 500 Australian businesses.

While the project is still underway we have some initial results which I am able to share with you today.

- Australian companies recognize that they need to be efficient and productive, innovative and attuned to their customers’ needs – and that their employees can be one of their most important competitive advantages
- Building their skill base is a key element of their strategy to maintain and improve their competitiveness over the next few years, along with finding opportunities to grow and innovate
- The skills that Australian companies are looking for in their employees already reflect the demands of a highly competitive environment, the rapid pace of technological change and more discerning customers
- Companies are demanding higher levels of skills, frequent updating of skills and excellent ‘soft’ skills as well as technical skills. All of these attributes remain important to employers in coming years.

**AND WHAT WILL HAPPEN IF COMPANIES DON’T GET THOSE SKILLS?**

This poses a real threat to the competitiveness of Australian industry – companies say most often that it is a lack of skilled staff that is a potential barrier to success in the next three years, ahead of competitive pressures both at home and abroad.

As every-one here is well aware skill shortages remain an issue of concern. In late 2004 AiGroup completed a review of Australian industry to explore the size and depth of the skills gap. The findings were startling. It was estimated that there were between 18,000 and 21,000 positions for skilled tradespersons in manufacturing that remained unfilled.

These were positions for machinists, boiler makers, electricians, engineers, fitter and turners, mechanics, plant managers, process workers, sheet metal workers, wood machinists and welders – it seems every meeting we have with employers includes a plea for more welders.

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**Small firms have particular difficulty accessing training that is tailored to their needs. We know the reasons why, but innovative solutions need to be found.**

**SKILL SHORTAGES AND FUTURE SKILL NEEDS**

But addressing skills shortages is only a part of the future skilling picture. The issue needs to be tackled on a number of fronts.

It is true to say that employers hold a range of views on the education and training system – but there is general agreement that there is considerable room for improvement.

**THE TRAINING SYSTEM IS SEEN AS NEEDING IMPROVEMENT IN FOUR KEY RESPECTS:**

**First**, the breadth and balance of skills offered, with a greater concentration needed on the critical employability skills. Employability skills remains a huge issue for industry; we are regularly hearing from employers that they are interviewing bright and technically skillful young people, but that they can’t employ them because they don’t have the full range of skills – the employability skills – needed to operate effectively in the workplace at any level.

This issue isn’t new and it is high time we seriously tackled it.

**Secondly**, responsiveness to industry needs, with greater attention being paid to employer requirements. With an increasing emphasis on the need to upskill existing workers industry has difficulty accessing the skills in the ‘size’ or ‘chunk’ it needs. Full qualifications are not always the answer. We need to move to skill sets where this is sufficient to meet industry needs.

An allied issue is incentives. The introduction of employer incentives has significantly increased the uptake of trainees and apprentices but it is AiGroup’s view that it is timely to take a fresh look at the Commonwealth incentive arrangements and seek to better match incentives with the skills needed to underpin the economy.

It is our view that these arrangements should be more closely aligned to the economic and social requirements of the current – and future – skill base needed to ensure Australia’s future competitiveness. The logical
extension of this is that incentives should also be linked to higher level VET qualifications and not just be linked to an original entry-level qualification.

**Thirdly**, flexibility at a system level. Particular areas of frustration are too little flexibility in the content of training packages; too little flexibility in training ‘pathways’ and too little flexibility in system aspects such as the length of apprenticeships.

It is untenable that training package qualifications can take 18 months and more to be developed and made available and that they must go through such a long winded consultation process which often sees their relevance reduced by compromise.

The system needs to be made more nimble – it is naïve to think that we can forecast our skill needs 10, 15, 20 years out. Instead what we need is a system which can – when we are in a position to articulate our needs – marshal its players quickly to have those skills codified.

But the drive for flexibility must not be at the cost of quality. Employers have far too many ‘war stories’ of tick and flick or superficial training efforts and have become strident in their calls for top quality training outcomes which demonstrate a return on their investment.

**Finally**, the flexibility and proactivity of training providers in responding to specific firms’ needs. Training providers must come to grips with this whole issue of working more closely with industry. Enormous strides have been made in recent years but this issue is opening up on a new front: Increasing training is taking place in the workplace and much of that training is informal. Training providers need to be able to work with this, to use it as a base, to apply workable recognition of prior learning processes and to train to the gaps.

And before leaving the issue of flexibility – a plea for small businesses; the engine room of the economy. Small firms have particular difficulty accessing training that is tailored to their needs. We know the reasons why, but innovative solutions need to be found.

**WHAT ARE EMPLOYERS DOING?**

In unprecedented numbers, employers are recognizing that they need to do more in a coordinated way to help meet their own needs – they are also quick to identify that some firms are not doing enough and that some disincentives need to be built into the system for the ‘free riders’.

There is every indication that employers will increase their training effort considerably in the next couple of years. They are expecting to devote a substantially higher proportion of turnover to employee learning.

**WHAT IS AIGROUP DOING?**

As an industry association AiGroup is demonstrating its response to future skilling needs in a number of ways.

**Technology cadetship**

We need to find new ways of training - Ai Group has developed a new contract of training and employment – the Technology Cadetship – which combines the technical and employability skills needed by modern manufacturing industry.

This program will offer an alternative pathway for those leading-edge enterprises seeking new options for skill development.

The Technology Cadetship will initially be available at two qualification levels which will take approximately 12 months and two years respectively to complete from start to finish. These programs will result in a nationally recognized qualification in manufacturing technology which the Ai Group believes will be attractive to a broader range of potential entrants than some of the more traditional training arrangements.

Victoria will be the first state to offer the technology cadetship with the first technology cadets commencing in December.

At a strategic level, AiGroup is an active voice in developing skill and related policies:

- 10 point strategy to build skills and capability
- Contemporary Apprenticeships for the 21st century
- Working on a Mature aged strategy.

And of course the World Class Skills for World Class Industries work.

**SKILLING IN A BROADER CONTEXT**

And finally, we need to think about skill as part of a broader human resource management effort. And there’s every indication that this is now happening. One of our members recently described their old approach to training as ‘spray and pray’ – they’d pay for a wide range of training, across the workforce, and just hope that they got some benefit. The nods around the room suggested they weren’t the only ones.

Today’s approach is very different; the skilling activities need to fit within the broader business imperative – they need to support the strategic directions of the firm.

**CONCLUSION**

I think it’s fair to say that the stakes have never been higher. The Australian economy is a global economy and so by definition our companies need to be world class. We need to ensure that our skills are also.

In identifying emerging skills it is my view that organizations such as AiGroup have a responsibility to work closely with our membership and to be able to help them to articulate their needs – sometimes to the training system, sometimes to government.

We will never know exactly what our emerging skills needs are. We need to accept that improved forecasting has a role but this should not be at the neglect of responsiveness. We need to ensure that the systems and structures can respond quickly and that the training delivered equips people with adaptable skills which can be transported and translated to other firms and to other industries – skills which will be a platform on which can be efficiently built the skills that will be needed in 2020.
It is widely recognised in business and within organisations that there is a need to re-examine how we will work and learn in the knowledge era. The mechanistic, lock step approaches of the industrial era are in many instances no longer serving their purpose. The forces of the knowledge era are being felt. Information overload, the pace of change, ever changing technologies, globalisation and the increasing uncertainty, diversity and complexity of relationships is causing us to question how we will develop skills and knowledge in the future.

**BACKGROUND TO THE RESEARCH PROJECT**

The TAFE NSW International Centre for Teaching and Learning (ICVET) established a partnership with the Department of Education, Science and Training (DEST) to research the development of professional capability in the knowledge era. The principal researchers are from TAFE NSW ICVET – Maret Staron, Robby Weatherley and Marie Jasinski. The research team is informed and advised by a Working Group of national and international learning and knowledge management experts and a National Reference Group that comprises representatives from states and territories. The National Reference Group is chaired by the Institute Director – TAFE NSW Illawarra Institute, Barry Peddle.

The aim of the research project, which is known as "Designing Professional Development for the Knowledge Era", is to develop a business framework for capability development in the knowledge era that supports workforce planning and organisational development. The vision is for learners taking responsibility for their own learning in complex and changing contexts and for organisations to support that learning through the development of rich learning environments. This involves the bringing together of strategy, theory, people and practice in new and creative ways so that organisations remain strategically positioned in the knowledge era.

The research project builds on the outcomes of a previous national research project "Working and Learning in Vocational Education and Training in the Knowledge Era" also managed by TAFE NSW ICVET.

A key output of that research project was the identification of eight enablers to support new knowledge being generated within organisations. The enablers are:

1. Socio-technical systems - integrate information and communication
2. Networks and relationships - foster greater understanding of the organisation from within
3. Organisational identity - connect staff to the organisation’s fundamental identity
4. Work outcomes and career paths - connect to the work and career trajectories of workers
5. Emergent professional development - establish structures that integrate the use of professional development resources with knowledge work
6. Worker as designer - provide workers with the autonomy to design their own professional development activities
7. Working and learning as an iterative process - build professional development into the iterative nature of knowledge work
8. Organisational environment - create organisational contexts that value intuitive thinking and working.

The research highlighted the need to think creatively to re-design capability development so that it would integrate the enablers into organisations. The current research project "Designing Professional Development for the Knowledge Era" examines these issues and identifies emerging models and strategies that would do this. As a major national research project, it is identified in the national Training Package Workplan as a key strategy for the vocational education and training sector. Specifically, it is referred to in Outcome 10 as Action 3:

**Outcome 10:** Strategies have been developed to strengthen teaching, learning and assessment

**Action 3:** Development of new models of professional development to support practitioners in the Knowledge Era – in partnership with NSW.

The project is to be completed in February 2006 and will identify generic capabilities, guidelines, new models and strategies for capability development, evaluation approaches as well as providing a range of case studies. The target audience is management to support them in establishing new directions in learning and development, as well individuals in the vocational and education training sector to provide them with...
new strategies for their own learning within the context of the knowledge era. It will also be easily customized by others for use in their own contexts.

There are two phases to the project. Phase one focuses on the development of the theoretical and conceptual basis for professional development in the knowledge era. This includes emerging concepts, models and strategies. Phase 2 involves the implementation of an Activation Strategy to disseminate the research findings of phase one, to seek feedback from people in the field and to discuss practical application. Four action planning forums are being held across Australia and the learning from the forums will be incorporated into the final research document. In the interim, papers are being made available on the TAFE NSW ICVET website www.icvet.edu.au.

KNOWLEDGE ERA AND KNOWLEDGE WORK

The context for the research project is the knowledge era which is characterised by complexity, rapid movement, turbulence, contradictions and multiple priorities. It is also characterised by a great amount of energy, excitement, opportunity and creativity. It is an ‘intangible era’ where the growing economic commodity is knowledge itself more so than goods and services. Who and how we know becomes more important than what we know. It is not just about accessing information but about how we learn to continually select, borrow, interpret, share, contextualise, generate and apply knowledge to our work. Relationships become as important as systems and processes.

Some see the knowledge era as comprising a ‘new vortex’ of:

- The ‘new vortex’ of the knowledge era

We need contemporary and meaningful ways to make sense of how to best work, learn and live effectively in these complex, diverse, unpredictable, challenging, opportunistic and irritating times. The knowledge era is disrupting our thinking, our relationships and our work practices and we must adapt to it to survive.

LEARNING ECOCLOGIES

A new metaphor is emerging. It involves a shift from the ‘networks’ metaphor to a ‘learning ecologies’ metaphor. Learning ecologies is a useful symbol as it is familiar to us in terms of the importance of our relationship to the environment, the holistic view that it incorporates and the underlying interconnectedness of all living things. Yet it is complex enough to fit the uncertain, self-organising and emergent nature of the knowledge era.

The learning ecologies metaphor links our lived experience and our humanness to our environment and work context. It focuses on our need to continually adapt and to be resilient to thrive in changing work contexts. It incorporates the need to constantly work with contradictions and paradoxes and to create space for:

- imagination and intuition and logic and reason
- a design mind set and a problem solving mind set
- conversations and face to face events and the virtual.

There is no one model or one solution for a way forward. Our current models and strategies for skills development and knowledge transference need to be expanded to incorporate life based approaches. Agility and a multiplicity of approaches are required. Key decisions need to be made about which systems and processes are best kept standardised and mechanised because our organisational wisdom tells us this is the most effective and efficient thing to do. And which systems and processes are best left ‘open’ so that people can apply their imagination, intuition and creativity.

LIFE BASED LEARNING

The models that we are most familiar with are the expert centred and work based learning models. The expert centred learning model focuses on the ‘teacher’ or holder of knowledge and the imposed and desired learning. The work based learning model focuses on the project and facilitator and processes such as action learning, where knowledge is constructed. Emergent in the knowledge era is the need for a model that is more closely aligned to the learning ecologies metaphor. Such a model is the ‘life based learning’ model which focuses on the ‘knower’, personal discovery and the continual reshaping of knowledge. These models are inclusive and interrelated and not hierarchical.
Life based learning allows for more of the ‘whole’ person to be present in their learning and at work. It adds to the possibilities for learning and development in vocational education and training. Life based learning acknowledges that what we experience and learn outside of work can be as important to our work as what we experience and learn at work. It makes explicit that individuals have skills and capabilities that are not always visible or recognized by organisations. It raises the importance of personal values and their profound effect on our work and culture.

Models are not always neatly applied in the workplace. The boundaries blur and at times learning can be a ‘messy’ and emergent process. No one model or approach is better than the other. The mix and match of strategies for skills development and knowledge transference relies on needs, context, resources, experience, personal preference, priorities and business requirements. Not only organisational learning but business wisdom becomes an imperative.

BUSINESS WISDOM

Business wisdom involves the breaking down of ‘silos’, increasing integration and connections at work and the courage to do ‘the right thing’. It involves insight, compassion, humility, common sense and good judgement. It is difficult to act wisely in organisations particularly when it contradicts directives, requirements, plans, funding arrangements and established strategies. It is about moving what is good and right from rhetoric to practice and working with contradictions and paradoxes. It is about being open to the unexpected, supporting people in learning through their mistakes and valuing foundation age old virtues such as generosity, sensitivity, authenticity, integrity, trust and good will. Generosity itself is an increasingly important virtue for the knowledge era.

ASSET OR STRENGTH BASED MODELS

A major shift needs to take place – from deficit based models and approaches to positive or strength based models and approaches. Deficit models focus on what is wrong, what is missing and how to fill the gap. Most of our planning approaches are based on these models which are a legacy of the industrial era. They are currently the dominant model for learning and development. Strength based models are more holistic and focus on what’s right and working well and amplifying this.

CAPABILITY DEVELOPMENT STRATEGIES

There are a number of learning and development strategies that best fit within a strength based model. Strategies such as learning conversations, appreciative inquiry, talent management, disruptive technology and positive deviance do this. These strategies and what it means in practice are being currently explored in the research project.

TIME FOR TRANSITION

People need time to reflect and work out ways of moving from the industrial era to working and learning in the knowledge era. From mechanistic modes of control and direction to knowledge based modes that support openness, taking personal responsibility for learning and knowledge transference. People need time to work out when mechanistic, standardised ways are the most efficient and effective way forward and when openness, trust, self organising systems and creativity is appropriate. Capability development should be characterised by variety, personal choice, conversations, generosity, adaptation and recognition of the iterative process that our work and learning is.

New metaphors, strategies and models for capability development in the knowledge era aim at creating sustainable and resilient workplaces. They support the embedding of the enablers in the workplace as well as re-energising staff and promoting the kinds of work cultures that we desire. The focus needs to be more on ‘reculturing’ through positive and strength based approaches, which are underpinned by values, rather than on short term solutions focusing on structures that often result in superficial change.

1 Dr Charles M Savage of Knowledge Era Enterprises “Shaping Our Future” – Cable and Wireless Optus, Melbourne, October 1999
This paper elaborates on a panel presentation I made to the B-HERT - Emerging Skills 2020 & Beyond Summit in Nov 2005.

**PREAMBLE COMMENTS**

Innovation and Business Skills Australia (IBSA) is a not-for-profit unlisted public company registered with ASIC.

IBSA is one of 10 Industry Skills Councils for the Vocational Education and Training (VET) system recognised and funded by the Australian Government to provide the formal link between industry and the vocational education and training (VET) system. IBSA is responsible for the nationally recognised vocational skills and qualifications to meet the current and future needs of Business Services; Education; Financial Services; Information and Communication Technologies; Printing and Graphic Arts; and the Cultural and Creative industries.

IBSA shapes skills in key areas including:
- generation, management and transfer of information, knowledge and data
- prudential management and investment of financial resources
- effective management of businesses
- communication of news, ideas and opinions
- preservation of Australia’s heritage
- creativity
- education, training and assessment
- innovation in products, services and business processes.

**STRATEGIC CONTEXT**

Changes in work, changes in the labour market, and changes in technology, increasing regulation and compliance requirements, and increasing competition in global markets are continually re-shaping the demand for skills and knowledge in Australia. The impact of an ageing population and workforce coupled with the need to increase participation levels in the Australian workforce, means that workforce skills development is a priority for all Australian enterprises and for all Australian governments. Individuals need to enter the workforce with high levels of skills and knowledge and to have the capacity for ongoing learning and skills acquisition.

The occupational groups in my organisation’s coverage include a high proportion of knowledge workers such as managers, administrators, professionals and associate professionals. Knowledge work within industries and organisations as well as innovation and creativity are increasingly being seen as the critical ingredients for future economic success.

The single most significant change factor in most industries has been technological change.

IBSA industries are important contributors to the Australian economy and require specific technical and occupational skills for their effective operation. More broadly, innovation and business skills help to create and sustain growth in all industries.

Convergence in technologies and industries is increasingly driving demand for cross industry skills. Changes in work processes will require training providers to be able to offer flexible responses to enterprises. Skills and qualifications articulating to and from higher education qualifications will also be required.

The single most significant change factor in most industries has been technological change. Changes involving digitisation, online transactions and the blending of industries will continue to impact and influence every Australian business as it grapples with upskilling its workforce, changing patterns of customer interaction and expansion into an increasingly global marketplace. Going forward, the industries that comprise innovation and business will face challenges provided by factors such as technological convergence which will break down traditional barriers between sectors and by e-security which will cause enterprises to deal with unwanted electronic interactions. All factors which will continue to drive skill formation needs across the sectors.

**BLURRING OF INDUSTRY BOUNDARIES**

The boundaries between many industries within IBSA’s scope are becoming increasingly blurred as new technologies and new products and services are brought into the market. New business ventures
combine telecommunications and entertainment; education and business services; or ICT and finance, for example. To thrive in this dynamic environment, enterprises will need employees with skills and knowledge across a number of specialist areas. Innovation, creativity and problem solving skills will also be required to support and exploit the integration of activities across industries.

Some good examples of new networking relationships, alliances, mergers & partnerships are:

- Telephone companies moving into Internet service provision
- Print houses into supply chain management & mail house functions
- Banks into financial & insurance services.

**Technological convergence**

Technical convergence can be described as different types of media combining into one operating platform enabled by transmission/carrier technology. Some examples include:

- ICT/media: broadcast, voice telephony & online computer services
- Printing: traditional print machines plus ICT
- Creative: photography, graphic arts, IT & digital imaging
- Bioinformatics: data manipulation - biology, computer science & IT
- Biotechnology: brain/machine interface - nanotechnology, IT, cognitive science.

**Functional convergence**

Functional convergence relates to a single channel providing multi-services beyond its original intent; is applications become the focus and not its operating system because it is enabled by technological convergence. Good examples include:

- Mobile phone – designed for voice, now offering print & text media (SMS), links to broadcast, links to web & visual transmissions
- Internet delivered to television sets (Web TV)
- Web casting of radio programming on Internet
- Voice over Internet Protocol (VoIP).

**ANOTHER EXAMPLE OF FUNCTIONAL CONVERGENCE**

Sound production has always been associated with music and media industries. With the emergence of digital media products and distribution channels, a cross-industry approach to training in the area of sound production became necessary. Therefore the concept of qualification/skills sets in sound production with specialisations in the application of sound production in film and TV, radio, live events, music recording studios, multi-media products (eg games, educational CD ROMs) was created. This is a new functional approach that recognises the cross-industry application of the function.

**Geographical convergence**

The growth in global "villages" & regional blocs has generally been enabled by convergent telecommunications & information technologies and the impact of Free Trade Agreements. We are now seeing national regulation moving to regional authority & regulatory compliance with examples such as:

- Global accounting standards being applied in Australia (ICT global standards have been applied in Australia for some time)
- Australia’s nationally recognised training aligning with international vendor certification
- Off-shore workforces supplying Australian businesses.

**The speed at which change occurs will be shaped by such factors as how quickly high-speed access becomes available to households and businesses across Australia.**

**OCCUPATIONAL SPILLAGE**

IBSA industries, particularly finance, ICT and business services, experience considerable ‘occupational spillage’ whereby workers using skills from IBSA industries are employed within other industry sectors and identify with those sectors. For example accountants, marketers, IT specialists, HR managers, receptionists and clerical staff that are employed in manufacturing, mining, retail, community services & health and other industry areas identify with those industries.

Because of the casualised and project-based work in the cultural industry, more and more artists and creative people apply their creative skills in some other form of work across industries in addition technology has had a significant impact on the cultural industry, particularly in the areas of writing, publishing, journalism, digital art, photo imaging and digital media.

Areas where technology is driving changes that will reshape future cultural industry activities include:

- convergence (e.g. digital television and the internet, movies with public broadcast systems)
- storage and access to media (DVDs, memory sticks, storage cards, MP3 players, digital TVs and set-top boxes)
- content management, particularly digital rights and authorities management that will enhance intellectual property protection or commercialisation
- conversion of traditionally print-based media and advertising to digital media
- internet radio
- subscription services across new media (e.g. mobile telephones) and
- integrated infrastructure able to carry video, voice, data and wireless signals.

Due to occupational spillage, employers from a variety of industries will have an interest in the skills of workers within IBSA industry sectors

As indicated by this list, changes in the delivery, distribution and storage of media will play the biggest role in changing the cultural industry. The speed at which change occurs will be shaped by such factors as how quickly high-speed access becomes available to households and businesses across Australia.

Other significant developments include the rise of viewer funded video on demand and other cable based services, which will revolutionise commercial broadcasting, currently based on advertiser funding.

IMPLICATIONS FOR INDIVIDUALS OF OCCUPATIONAL SPILLAGE

Due to occupational spillage, employers from a variety of industries will have an interest in the skills of workers within IBSA industry sectors, and may seek input into the development of appropriate training products and services. However, in some instances employers from non-IBSA industries may take no responsibility for the ongoing skills development of these workers. As a result, consultancy firms, labour hire companies and personnel agencies may be charged with responsibility for the ongoing skills development of the out-source workers they supply. Individual employees in other industries may also be expected to take responsibility for their own development and will need access to flexible professional development solutions.

IMPLICATIONS FOR LEARNING AND DEVELOPMENT OF TECHNOLOGICAL ADVANCEMENT

Training is required for the implementation of every new technology (hardware, software and systems) into the workplace and ongoing training will be needed to ensure that these technologies are used effectively.

The increasing complexity of technologies in use within all organisations will require greater skills and knowledge on the part of ICT support staff. Some workers within the ICT industry will be expected to understand a wider range of products, applications and integrated and customised solutions.

On the other hand, sections of the ICT industry will become ever more specialised with many small businesses and consultancies focusing exclusively on particular aspects of ICT support. In these cases it will be necessary to build relationships with businesses offering complementary services so that customers can be offered complete solutions.

Sectors within the cultural industries will demand imaginative skills to capitalise on opportunities to devise entertainment and information products for a new generation of wired customers. Skills to exploit business opportunities in new fields like podcasting, SMS and digital broadcasting will be highly valued.

Widespread uptake of new technologies, and near universal internet access, will have impacts on the nature of training and education. Desk-bound IBSA industry sectors will increasingly expect to conduct workforce training and development online or through computer-based applications. Internet services will allow even small businesses to access affordable and flexible online training opportunities.

Increased internet access has a number of implications for the education industry:

> Demand for quality online provision of training will increase from individuals, SMEs and large employers.

> Educational practitioners at all levels will need skills in developing learning materials for the online medium, and in interacting with learners virtually.

> The education industry will not only need to give greater attention to the development of quality training products and services for their students but also to developing the skills of educational practitioners who, like the rest of the workforce, reflect an ageing demographic not necessarily comfortable with new technologies.

TRAINING AND LEARNING DEVELOPMENT

Given the research and market intelligence into the various drivers in the economy – particularly the realities of technological and occupational convergence, IBSA is developing an Integrated Skills and Qualifications Framework which builds on the eleven nationally endorsed Training Packages in our coverage. Within these Training Packages, initially developed by six different organizations, there are over 260 competency-based industry qualifications and a couple of thousand units of competency. The ISQF is IBSA’s response to the next generation of training products and services.

It is a complex and challenging initiative that will take some time to develop and field test.

We need to work with industry to define the skills required for a ‘creative economy’ which is innovative in the design of business processes. We need to work with academics and educational practitioners to design responses that will ensure we build the capability of Australians to be creative in problem solving. IBSA and other ISCs are uniquely placed to bring together the expertise of industry and education so that
Australians are able to benefit from technological, functional, geographical and business convergence and able to capitalize on opportunities to combine different skill sets and experiences and enjoy the benefits of occupational convergence.

The ISQF needs to work for industry, individuals and providers of training. The IBSA Board has agreed that the development of the ISQF must be underpinned by the following guiding principles:

- support nationally portable qualifications and skill sets
- support industry identity
- support quality delivery
- respond to convergence of industries, technology and skills
- support innovation and creativity in skill development and organisational development more broadly.

For further information on this initiative, our research and market intelligence captured in our Industry Skills Report and the rest of our work program, our web site can be located at www.ibsa.org.au.

**THE NEW ENGINEER**

ROLFE HARTLEY, National Vice President, Engineering Practice, Engineers Australia

**WHAT IS ENGINEERING**

In the context of describing the skills required of an engineer in the future, I thought it appropriate to describe what engineering is. Engineering is the application of pure science to practical problems. It is a professional activity that uses imagination and judgement in the application of science, technology, mathematics, and practical experience to design, produce and operate useful objects or processes that meet the needs of humanity. Engineering allows us to enjoy the benefits of scientific progress. Whatever our measure of progress is, physical consumption, lifestyle, or ecological sustainability, we are dependent on engineering.

**WHY WE NEED ENGINEERING SKILLS**

Australia’s competitiveness depends on qualified and competent engineers and scientists. The contribution that engineers make to Australia’s wealth, in economic and social terms, is through value adding to products and services of all types, but particularly to high quality, high technology industries. This is highly dependent on the skill level of the engineering profession.

A basic fact of economics is that growth is driven primarily by improvements in productivity. In Australia, and elsewhere, productivity growth has been strongest in engineering-intensive sectors.

Anecdotal evidence shows that for each professional engineer employed on research, development, design or product improvement, there are between 20 and 50 other people employed in the production, testing and servicing areas together with others in support functions of finance, commercial and materials supply. This 20 to 50 figure does not take into account those in the supply chain, transport, legal, banking and other support sectors.

In the international arena, the pace of development is quickening. For Australia to participate, we must pursue scientific and technological advances. Australia must develop technologies that will ensure the competitiveness of our goods and services in the global marketplace of the future. Australia’s engineering and scientific workforce is integral to ensuring that we
become a strong player in world markets, and in solving domestic and regional economic, social and environmental issues.

**ENGINEERING SKILLS OF THE PAST**

In the past, engineers focused almost exclusively on technical issues and in many ways lived in a ‘technological bubble’. Engineers did their technical analysis and made their recommendations to clients or Governments on technical grounds: social and economic analysis, communication and environmental impact analysis (if it existed) were the responsibility of someone else.

*In the 1970’s, employers were satisfied with an engineering graduate’s knowledge of basic sciences, skills knowledge and discipline of engineering studied, laboratory work, engineering design and computing skills.*

The way we worked was different, too. There was a separate, clearly defined position for everyone. Each person had certain skills that they applied to their work and there was very little overlap amongst professions and between professions and trades.

The education of professions and others had very clear demarcation lines. For instance, engineering education in the 18th and 19th century was principally based on the trial and error design method, and did not interact with other disciplines to any large degree.

With the advent of a more scientific approach, 20th century engineering education focussed on technical aspects, requiring a foundation in mathematics, physics and chemistry, which overlapped science education.

However, 20th century engineering education did not focus on producing graduates with a social understanding, or human interaction and written communication skills, and this seemed adequate in the early part of the century. But as the world changed, so to did the expectations of employers and purchasers of engineering services.

In the 1970’s, employers were satisfied with an engineering graduate’s knowledge of basic sciences, skills knowledge and discipline of engineering studied, laboratory work, engineering design and computing skills. But employers believed that graduates had little skill in management of people, costs and resources, and had poor communication skills. As a result, engineers were generally portrayed as being conservative, overly theoretical, rigid and poor communicators. This image is still prevalent today. Engineers are often seen as being pre-occupied with technical issues to the exclusion of everything else.

While this nerdy ‘shorts and long socks’ image may remain in people’s mind, the actual work and skills of the engineer has changed considerably, and will change even more in the future.

**CURRENT DEMAND FOR ENGINEERING SKILLS**

The new engineer requires a wider range of skills than university engineering curricula provided in the past. Engineering has undergone a dramatic change. Engineers have highly technical skills. They provide practical solutions to society’s problems by applying scientific principles, but they must also use a high level of creativity and ingenuity and have a thorough understanding of the total implications of their work.

Engineering has moved from a profession that only provides competent technical advice, to a profession that services the community in a socially and environmentally responsible manner. Business and industry are demanding more than technical proficiency from the engineering profession. Engineers are required to not only choose a technological solution, but also consider this in the social context, and to give consideration to the long term impacts of their work. Engineers today are required to take direct responsibility for the implications of their actions and for communicating their proposals directly with the community. This is no longer ‘someone else’s problem’.

The image of engineering has changed as well. Increasingly, employers regard an engineering degree as a good ‘general’ degree. Engineering qualifications have become highly regarded by employers because of their emphasis on risk management, ethical practice and sustainable outcomes. In this way, graduates from engineering courses have become a new source of managers and leaders for many organisations and professions. This trend will continue to grow.

Many engineers, particularly those who have completed double degrees combining accounting, law or economics, are finding employment in large consulting firms. Many may never use their technical engineering expertise directly. While the number of engineering graduates produced is static, the pool of potential employers has increased. Engineering consultancies are finding it harder and harder to recruit engineering graduates, particularly to technical areas.

In addition, many engineers who begin their employment in technical fields and this may be as great as between 20 percent and 50 percent, based on feedback from Engineers Australia member surveys - move into management roles and out of direct practice in their field or discipline. The sleeper issue is the expertise drain from technical engineering to management and leadership.

**THE NEW ENVIRONMENT**

The scope of technological change is increasing at a rapid pace. During the 20th century, research and innovation in engineering and science sub-disciplines have enabled us to produce a profound scientific understanding that allows multidisciplinary teams to address problems and opportunities that were totally beyond our capacity to deal with just a few short years ago.

The nature of engineering has changed, and it is no longer the monopoly of professional engineers, as there is a merger between all disciplines in the technology
area. As well, technical disciplines are less structured and more multi-disciplined. Students are now undertaking core general subjects in the early part of their degree, with supplementary specialised subjects in the later part of their degree, or as post graduate studies and double degrees are more popular than ever.

Industry and commerce are more dynamic than ever, and most young people will change occupations at least a few times in their working life. They therefore need transportable skills as well as discipline specific knowledge. The education sector must keep pace with the technological change, and with the needs of business and industry.

... there are, I believe, five major skill areas that will be demanded by future employers.

ENGINEERING SKILLS NEEDED IN THE FUTURE

There is agreement that skills and competencies of the workforce will need to be upgraded in response to technological innovation, the emergence of new customer needs and sociological and environmental changes.

Given the technological race occurring across the world, the demand for environmentally friendly practices, and sustainable development, there are, I believe, five major skill areas that will be demanded by future employers.

The first is a very strong maths, science and technology base, which includes specialised engineering and science skills. There is a current need for technical skills to understand and create new technology, and this will continue well into the future. As well, the community as a whole must be technologically literate to understand and take up technological advances. Technological literacy is also required of to critically examine and question technological progress and innovation and to make informed decisions about the role of technology in their lives.

The second is communication skills. Graduates need to complement their technical skills with good communication skills so that they are able to explain and convince the community and the marketplace of their ideas. The must also be able to communicate well with peers and with other people in their workplace.

The third is teamwork and interdisciplinary knowledge. Given the multidisciplinary approach needed for innovation, emerging trends will require workers with skills across a number of disciplines.

Core staff will be expected to learn from each other and will be expected to cope with continuous upgrading of the knowledge base. In a more complex environment, the ability to work within a multidisciplinary team will be essential. As well, globalisation brings about the challenge of cultural understanding.

The fourth is entrepreneurial and business skills. Industry will need people who possess both research skills and the entrepreneurial drive. Engineers of the future will need to have a wide range of interests, and be able to deal with, if not embrace ambiguity, uncertainty and controversy, rather than take an ordered, precise view of the world. The new engineer will also need business acumen, and will need good project management and financial management skills.

The fifth skill area that the new engineer will possess is the skill to identify and analyse the political, ethical and economic dimensions of the work they do. Engineering will require a variety of skills, including judgement and choices. Engineers will work as part of teams where there will be no single solution to a problem. Good solutions will require skills to weight up the social and environmental effects of the solution. These solutions are generally the result of teamwork.

FUTURE CHALLENGES

Skills shortage

We are currently experiencing a skills shortage of engineers, as well as other skilled professionals in Australia, and there is no sign that this will be alleviated in the near future. To ensure that we do not have future skills shortages, we need to:

- Change primary and secondary education so that many more children have an interest in science and maths, and also see engineering as a valued and rewarding career choice
- Increase the number of Australian engineering graduates by ensuring that there are enough places at universities all around Australia for those with the potential to study engineering
- Ensure we have a good balance between science and engineering graduates.

Knowledge and skills transfer

As well, we have an aging workforce. The practical knowledge and experience that our retiring population will take with them is concerning. For instance, there are many years of experience required to know how to turn a 2 dimensional drawing into a 3 dimensional efficient, reliable and cost effective object. There is now only a short amount of time left to pass on the knowledge and experience from our older engineers to those that will replace them in the next 10 years.

Science and engineering balance

The focus in the past on the scientific base of the engineering degree has also resulted in a misapprehension that engineering is a subset of science. This has caused problems in raising the issue of the need for more engineers in Australia.

According to OECD figures, Australia’s stock of human resources in Science and Technology including engineering has improved over the past ten years, rising from 476,000 in 1996 to 560,000 in 2001, an increase of 17.6% over the five year period. In 2000, 16.7% of new graduates in Australia received science and
engineering degrees, compared to 21.7% of graduates in the OECD. But when the data are split into science and engineering, the real picture begins to emerge.

While around 11.8% of new graduates in Australia were awarded science degrees, engineering graduates accounted for only 7.9% of total graduations in Australia. In comparison with other countries, Australia has a low rate of entry into and graduation from engineering. Internationally, the number of engineering graduates per million lags many other OECD countries. The graduation of approximately 5000 students from engineering degrees each year, for the past 10 years, means that the growth in Australia’s science and engineering graduates has come from increased science enrolments alone.

Much of this data points to the balance between engineering and science being out of alignment at a time when we should be as focused on converting ideas into products, as we are on conducting and publishing research. Scientific advances represent enormous potential, but commercialisation is constrained by a disproportionately limited engineering skills base. As a result, Australia is losing its ability to compete successfully in the rapidly growing knowledge-based economy.

THE ENGINEERS AUSTRALIA RESPONSE

So what is Engineers Australia doing to address the issues I have discussed?

The badge of competence for independent engineering practice is the title ‘Chartered Professional Engineer’. This title is granted only after detailed evaluation of a candidates qualifications and career experience against a comprehensive set of competency based criteria. These criteria are reviewed regularly to ensure that they keep pace with the changing competencies and skill sets that I have discussed.

Retaining Chartered Status requires an engineer to undertake 150 hours of continual professional development (CPD) over a three year period. Through our Divisions, Colleges and Technical Societies, Engineers Australia endeavours to provide CPD material that supports and enhances the skills of the ‘new engineer’, not just the traditional technical skills.

CONCLUSION

Engineering directly helps to change and improve our world. Engineers can create imaginative and visionary solutions to the challenges facing the planet in this new century and beyond. The problems of feeding the world and how we will use energy but still protect our environment will be answered by engineers.

Let’s hope that action is taken now to ensure that there are enough engineers around with the right skill set to complete the tasks ahead.

Creativity has become one of the new buzzwords – you hear about it in government, in business and now in relation to education. The question that comes to mind when we hear the word ‘creativity’ is: what does it mean and what difference does it make? As with other buzzwords that have come and go – words such as ‘community’, ‘partnership’, ‘social capital’ – it can mean different things to different people and it is one of those ‘hurrah’ words that are tagged on to policies or programs to make them seem innovative. We’ve heard of ‘creative nation’, ‘creative leadership’, or even ‘creative management’, but deep down inside we are sceptical of such policies and programs because, for most people, the idea of creativity is tied up with a bundle of myths and misconceptions.

First of all, there’s the myth that creative people are either a genius or slightly mad. In other words, creativity is either a gift that people are born with, or a consequence of some mental abnormality. The idea that people can learn to be creative is something we seldom consider.

Secondly, in the public’s mind, creativity is associated with great artists and scientists – the Picassos and the Einsteins, the Great Masters and the Nobel laureates. Anyone with lesser intelligence or achievements would be regarded as a mere craftsman or technician. So, once again, we believe that only brilliant minds can be creative.

Thirdly, creativity evokes ‘Eureka’ moments and quantum leaps – discoveries and breakthroughs that are dramatic or even earth shattering. There is little acknowledgment of the creativity involved in the incremental and plodding works that precede the final breakthrough. Since Eureka moments are rare in the history of science, breakthroughs are seen as a matter of luck or accident, rather than persistent hard work.

Finally, creativity is assumed to be an individual, rather than a group achievement, following a tortuous process that involves long periods of hard work and incubation, ending in sudden (flash bulb) insights or
inspiration. In this view of creativity, all the perspiration and ultimate inspiration happen to an individual – it has nothing to do with anyone else.

In short, our cultural myths tell us that creativity is something you’re born with; it has nothing to do with ordinary people; and it is definitely not something that can be learnt or developed in a group situation.

Very few people and organisations can afford to stand still, and yet most of us and our institutions are not well equipped to meet the challenge of a changing world.

I would argue, however, that the opposite is true: creativity is something that can be nurtured and developed among all of us. In fact, I would argue that we no longer have a choice – for individuals as well as for organisations, learning to be creative is now a necessity, not a luxury. The world is changing faster than in previous generations. Information and communication technologies have transformed the workplace in less than two decades. Markets and regulations are in a constant state of flux. Environmental and security crises are part of everyday realities. Very few people and organisations can afford to stand still, and yet most of us and our institutions are not well equipped to meet the challenge of a changing world.

Take the global problem of terrorism. It is a threat that has justified pre-emptive wars, draconian laws, intrusive surveillance and tight border controls. It has fundamentally challenged our political system that values national autonomy, democracy, privacy and the rule of law. Australia is pouring millions of dollars into increased surveillance, tighter security, smarter equipment, and – what is of most interest to me – a doubling of the number of spies. No doubt this will enhance the job prospects of our criminology graduates, but the track record of our intelligence community does not inspire confidence. I read with interest that the US 9/11 Commission Report identified the ‘failure of imagination’ of the American government as ‘the most important failure’ that led to the success of the terrorists (US National Commission Report 2004:356). The Commission thought it was crucial to ‘find a way of routinizing, even bureaucratizing, the exercise of imagination’ (US National Commission 2004:361).

Having spent the last 15 years studying the police as an occupation, I can only applaud this new initiative to make governments and security experts more imaginative and creative. The crucial issue here is the almost medieval organisational culture that exists in many law enforcement and possibly other government agencies that penalises mistakes and discourages innovations.

The organisational theorist Edwin Schein (1985) has written about two different ways of learning in organisations. First, there is problem-solving learning which encourages exploration, imagination, experimentation, in other words, creativity. Secondly, there is mistake-avoidance learning which is just the opposite and has the opposite effect. In my research, I found that most police officers are socialised into a culture that fears mistakes – they know that with literally hundreds of rules in the rule book, the ‘boss’ can get at them very easily. So the best strategy to survive is to keep their head down, not to make waves, do as little as possible, and above all, ‘cover your arse’. Sadly, ‘problem-solving policing’ has mostly been a slogan in most police forces because a bureaucracy that discourages creativity among its members is stuck in a reactive mode. As the renowned physicist David Bohm wrote many years ago, in order to be creative and original, a person must be able to try something new without being afraid of making mistakes (Bohm 1996:5).

How do we nurture creativity among students and workers? – this is one of the questions that is the subject of my current research on creativity among artists and scientists. It is often thought that rewards, support and freedom – the standard behavioural drivers – are all we need to encourage creativity, but that assumes that teachers and leaders of organisations are capable of recognising creativity and knowledgeable enough to know who and what to reward and support. It is safe to assume that most teachers and leaders have spent most of their career either coping with the daily grind or managing crises. Creativity – if it enters at all in their work lives – is rarely recognised as such and often does so by chance rather than by design. Most think of creativity as a luxury they can’t afford, or something that is flighty and lightweight, suitable for artists maybe but not for serious professionals. And yet, we all recognise the importance of ‘chilling out’ or taking a break as a way of reinvigorating our mind and body. Such a break is often an opportunity for creative ideas to incubate or for the unconscious mind to process information, but we have not been trained to recognise it as such. We are so worried about losing time when we take a break that we never take full advantage of its benefits. So it takes creative teachers and creative leaders to truly nurture creativity – any one less would merely see creativity as another mechanical tool for generating learning outcomes or company profits.

I want to conclude by talking about the relationship between happiness and creativity. At a time when fear and insecurity seem to dominate our consciousness, when depression has become a national and international problem, and when affluence has not improved our sense of well-being, the question of what really makes us happy is intriguing researchers around the world. We need to put away the idea once and for all that creative people tend to be crazy or suicidal or that it is pain that provides the fuel for creativity. There is research evidence that being absorbed in the
creative process is an extremely satisfying experience – engaging in creative activities can result in a higher feeling of happiness and improved self-esteem (as suggested by the eminent creativity researcher Mihaly Csikszentmihalyi’s [1990] flow theory). On the other hand, inducing positive emotions (through something as simple as giving subjects free lollies) can make people think more creatively and feel more satisfied about their work (Estrada, Isen and Young 1994). So, we can see that creativity and happiness can reinforce each other. There is now good evidence that creativity does not decrease with age, and creative activities are just as important for successful ageing as physical exercise and a healthy diet (Fisher and Specht 1999). As our life expectancy increases – most of us are expected to live to be 85 or even older – our happiness in those twilight years depends on our capacity to maintain physically and mentally active and creative.

In conclusion, I have argued that creativity can be developed and nurtured. It is essential for the survival of individuals and organisations in a changing world. It is a crucial ingredient for generating and reinforcing a sense of well-being, especially among an ageing population. And, most important of all, we need leaders and teachers who are themselves creative in order to recognise and develop a nation of creative workers. In my view, then, creativity is no longer a luxury we can’t afford, it is a necessity we can’t afford to be without.

References
of supply from lesser developed countries and increasing competition and demand from China, India and Asia. Environmental, corporate and social responsibility are high priorities on the Corporate Agenda.

The minerals sector in Australia contributed eight % of GDP in 2003-4 with over $500 Billion directly to Australia’s wealth over the past twenty years. In 2004/5 the mineral resources sector contributed $67 Billion to Australia’s merchandise exports (37%) and 28% of total exports of good and services. Exports of mining technology, equipment and services totalled $2 Billion which represented 60% of the mining software used in operations around the world. Since 1967 the industry has built 26 towns, 17 ports, 26 airfields and over 2,000 km of railway line.

The global significance of the Australasian minerals sector is as follows:

- Largest exporter of iron ore and black coal
- Largest producer of bauxite, alumina, diamonds (by volume), ilmenite, rutile and zircon
- Fifth largest producer of aluminium and coal
- Second largest exporter of uranium with the world’s largest resources of low cost uranium
- Second largest producer of zinc ore
- Third largest producer of iron ore, nickel and gold.

The Minerals Sector in Australia has proportionately a low level of labour which is geographically spread. The industry is high tech with high capital costs and a current contribution to GDP per employee of $359,000 per annum compared with an all industries average of $70,000. The industry has a homogeneous culture with low levels of acceptance of diversity and this has caused retention of skills problems. However, Australia has slipped in the past few years from 20% of world exploration to 12.6% in 2004 and thus breakthroughs are imperative to find the next generation of resources.

Although there are currently skills shortages due to increased demand, the employers have met the increased demand by poaching and paying higher prices for labour.

"As the population ages a fault line is emerging that separates the past and future landscapes of the Australian workforce. For the foreseeable future, growth in the supply of labour will be firmly concentrated in the group aged 45 years and over. For every new young person entering the labour market today, there are seven people aged 45 years and over available. By 2010 this will create permanent shortages in the Australian Labour Market forcing organisations to dramatically re-think their employment practices."

Drake outlines key risks for all employers:

- Increased competition for labour
- Expansion of skills shortages
- Increased competition for younger people
- Increasing mismatch between the available labour pool and the competencies and characteristics required
- Loss of operational knowledge, due to low retention rates and exit to retirement
- Loss of executive knowledge, due to exit to retirement
- Impaired productivity consequences
- Falling or stagnating growth
- A shifting landscape of health and well being
- Limited capacity amongst the organisations managers and leaders to assess and respond to the changed environment.

The minerals industry has not been good at forecasting its future skills needs nor what the mine of the future may look like. With the impact of cyclicality, ever-increasing economies of scale through introducing new technology and the actual numbers required a small proportion of total science, engineering and technology graduates, the numbers of minerals related courses is declining. Although there are currently skills shortages due to increased demand, the employers have met the increased demand by poaching and paying higher prices for labour. If demand continues this is not sustainable.

Thus, to maintain a sustainable minerals sector in Australia some market interventions are required in the provision of tertiary education to ensure the SET skills are available to an industry of "National Importance".
Initiatives to address the supply of the required skills to ensure that opportunities are not lost should include:

The Government to embrace the sector as nationally important and improve incentives for teaching of SET in primary and secondary schools, to move SET related courses to higher clusters for funding in tertiary education, to act as a catalyst for and support through CRC’s, CSIRO and Universities for breakthrough research appropriate to the Australian environment and to continue to highlight the implications of the ageing population.

Employers need to target current underemployed sectors, utilise international recruitment to meet peak demands, to understand and cater for the new generations, be more open to flexibility and embrace diversity, provide career opportunities information into Government initiatives, provide a longer term commitment to Human Resources and this requires research into future skills needs and to research and understand the implications of an ageing workforce.

The education sector needs to provide national solutions for R&D, curriculum, teaching and cooperation (ie. MTEC) together with many of the suggestions above for employers.

All groups need to implement initiatives to assist in increased participation rates through:

1. improving educational attainment
2. delaying retirement
3. improving childcare facilities
4. undertaking welfare reform, and
5. improving health.

CONCLUSION

We all need to seize the opportunity in Tertiary Education by focusing on discipline areas of national importance as outlined in the “National Strategic Principles for Higher Education” to ensure the sustainability of the minerals sector in Australia, by backing a winner and this does require some interventions.

In memory of Peter Drucker who died 11 November 2005, aged 95.

The important challenge in society, economics, politics, is to exploit the changes that have already occurred and to use them as opportunities. The important thing is to identify the “future that has already happened” -- and to develop a methodology for perceiving and analysing these changes. – Peter Drucker, 2005

INTRODUCTION

In 1959, in his book, Landmarks of Tomorrow, Peter Drucker coined the term “knowledge worker”. The knowledge worker was a post world war two phenomenon catching up and then overtaking the contribution of manual and factory workers’ to the US economy and reflecting the changing structure of all developed economies away from manual jobs. Refer to Chart 1.

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IN ALL WORKERS ARE KNOWLEDGE WORKERS

BILL SHORTEN,
National Secretary,
Australian Workers Union

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We all need to seize the opportunity in Tertiary Education by focusing on discipline areas of national importance as outlined in the “National Strategic Principles for Higher Education” to ensure the sustainability of the minerals sector in Australia, by backing a winner and this does require some interventions.
I believe that given the overwhelming trend toward the development of the knowledge dependent worker and economy, all workers are becoming knowledge workers. The working environment is critical in the face of this trend.\(^v\)

And it is that general proposition that should be guiding the development of the policy responses by governments’ to the economic problems facing this country, in particular dealing with population ageing and declining productivity.

Productivity was growing at well over two per cent per annum in the 1990s. Today, it is going backwards, with labour productivity recording negative 1.3 per cent growth in 2004-05, and multifactor productivity, even worse at minus 1.7 per cent.\(^vi\) Australia is relatively less productive than other developed economies while working relatively harder (measured as GDP per hours worked and the number of hours worked). Australia is using more perspiration than inspiration in its work.

**THE KNOWLEDGE CENTURY**

All Australian workers are knowledge workers capable of exploiting their potential to drive productivity as the knowledge economy in the 21st century.

Unlike 20th century jobs, which required telling the worker how to do the job, making knowledge workers more productive requires change in basic attitudes not only on the part of the individual knowledge worker, but on the part of the whole organization. In other words, there needs to be mutual agreement on what is to be done.\(^vii\)

First, knowledge workers assist in determining what is to be done. In this way, knowledge workers, collectively, own the means of production. Australia’s workers for example have, through their stakes in superannuation and mutual funds, become shareholders and owners of many large businesses in the knowledge society.

Second, knowledge workers need access to an organisation - a collective that brings together an array of knowledge workers and applies their specialisation to a common end product.

The most gifted mathematics teacher in a secondary school is effective only as a member of the faculty. The most brilliant consultant on product development is effective only if there is an organised and competent business to convert her advice into action. The greatest software designer needs a hardware producer. But in turn the high school needs the mathematics teacher, the business needs the expert on product development and the PC manufacturer needs the software programmer.

Knowledge workers therefore see themselves as equal to those who retain their services, as "professionals" rather than as "employees". The knowledge society is a society of seniors and juniors rather than of bosses and subordinates.\(^viii\)

There are consequences for both the qualifications of the employed labour force and the pattern of employment; for managing people and making them productive; and for economics and for politics in the face of the challenges and opportunities from globalisation.

We need to consider the role of education and training in creating knowledge workers, the importance of organisations in maximising the productive potential of knowledge workers and the policy mix to drive productivity growth in Australia in the era of the modern knowledge economy.

**THE NEXT GENERATION OF KNOWLEDGE WORKERS - THE AUSTRALIAN EXPERIENCE**

So how does Australia increase the utilisation of knowledge in the production of goods and services? The answer lies in educating, acquiring skills and innovating.

First, it is absolutely essential to know and understand the workforce in order to improve performance, including the role of education and skills. You cannot ignore those in the community who are in the business of service provision and who impart skills in the economy. That means the states, unions, business, our schools, universities and workplaces.
These institutions hold the keys to unlocking the productivity dividend, particularly when confronted by chronic falls in participation rates in the face of population ageing. On current projections, our historic high workforce participation will collapse over the next 40 years from 64% to 56%\textsuperscript{ix}. And lower historic high workforce participation will collapse over population ageing. On current projections, our chronic falls in participation rates in the face of productivity dividend, particularly when confronted by these institutions hold the keys to unlocking the Australia’s longer-term economic interest.

\textbf{ACQUIRING SKILLS}

And commentators recognise that it is not apprenticeships versus tertiary education. We need the skills supplied from both streams.

The Howard government talks the rhetoric of a skills-based economy but resorts to window dressing policy. It holds inquiries rather than taking decisions in Australia’s longer-term economic interest.

At a national level, the States and organised labour are cut out of the policy process. The result is a mismatch in the supply of training with demand because the States differ in their current and projected skills shortages. For example, in WA, with its younger demographic, mining engineers are more urgently required than aged care workers. In South Australia and Tasmania, it is the reverse.\textsuperscript{xxii} In Victoria, manufacturing skills are required. The policy challenge therefore is to address each skills shortage by supporting State based initiatives that can be extrapolated across the country as best practice.

It is the interrelationships between governments, institutions, companies and unions, combined with lessons learned and a fresh approach that can lead to successful skills development. That by and large occurs at the decentralised and local level such as secondary colleges offering vocational opportunities to students often in partnership with TAFE and Universities in cooperation with state authorities, business and the local community.\textsuperscript{xxiii} Australia requires a coherent policy framework that combines the strengths of service providers throughout the country.

\textbf{THE NATURE OF ORGANISATIONS AND THE POWER OF COLLECTIVE BARGAINING}

Collective enterprise arrangements - that include unions as partners in the production challenge - work. Enterprise agreements can extract the productive potential of the workforce in a way that individual contracts can never do.\textsuperscript{xxiv}

We need to understand the nature of organisations in dealing with risk and uncertainty and how the enterprise working as a team maximises productivity and profit in the age of the knowledge economy.\textsuperscript{xxv}

The concept is simple: The individual player has neither the skills, knowledge nor means to succeed alone. One person could never have built Scotland’s famous Bell Lighthouse or the Snowy Hydro Scheme.

\textbf{International comparisons show that the more highly educated the workforce, the more individuals will participate in the workforce and the more productive the workforce will be.\textsuperscript{x}}

What is absent is an education strategy, which understands the importance of investment in the knowledge economy as a national priority.

There are two strands to this argument from an economic perspective. Individuals will be able to place a value on the importance of education and training in terms of their own marketability as knowledge workers. But, correspondingly, individuals cannot know their true productive potential because their contribution as knowledge workers is co-dependent on the collective of other workers and management in the productive enterprise. Because of this asymmetry in information, individuals will tend to under-invest in their own education and training limiting returns to the economy as a whole.

There is therefore no doubt a strong case for more public funding. And Australia has been unique among advanced economies in allowing public education spending as a share of national income to fall.\textsuperscript{xxvi} Public spending on education as human capital formation should be a key policy priority of every tier of government because investment in education pays off.\textsuperscript{xxvii}

Recent OECD statistics illustrate that Australia performed relatively poorly in the level of tertiary educational attainment in 2003 as a share of total employment and is just above the OECD average.\textsuperscript{xxviii} There is evidence that increases in HECS has reduced the number of Australian graduates.\textsuperscript{xxix} Yet, employment growth of tertiary level graduates between 1998-2003 has been well above the OECD average.\textsuperscript{xxix} We are under achieving our productive potential.

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workforce, childcare, health, OHS, incentives for retaining older workers, incentives for investment in R&D and infrastructure for business to do more business and to innovate. These are the kinds of reforms that will drive productivity, participation and growth.

**INNOVATING IN THE KNOWLEDGE AGE**

According to the OECD’s recently released Science, Technology and Industry Scoreboard 2005, Australia ranks last among all the OECD countries in ICT sector trade balance as a share of total goods trade in 2003, xxiii Refer to Chart 4. ICT is recognised as the enabler of the knowledge-based society.

Yet, Australians are world class at innovating new techniques and ideas. We have world-class medical research centres and our scientists are internationally recognised for their research work. We are also world beaters in innovative software engineering and project management.

But we must nurture rather than squander these skills and creativity, xxiv The missing ingredient is government policy and attitudes to make and market Australia as a tech nation including the necessary skills to better manage R & D to commercialisation in cooperation with the private sector.

In contrast to overseas experience of countries such as Korea, Japan, the US and Sweden, the Australian Government cannot remain sidelined in such long term policy planning. As Drucker has shown, the Japanese are ahead in robotics because they paid attention to demographics, xxv

Fresh thinking and a fresh approach are needed, xxvi We need to see beyond the horizon and plan for “the future that has already happened”. xxvii

**ENDNOTES**


ii The Economist: Knowledge workers are the new capitalists, 1 November 2001 http://www.ebusinessforum.com/index.asp?layout=rich_story&doc_id=4772&categoryid=&channelid=&search=knowledge+workers

iii ibid

iv Knowledge workers now represent 39.2% of all employed persons in the Australian labour force.


vi ABS Cat No 5368.0. The IMF has warned Australia that it needs to regain its record productivity growth performance of the 1990s just to maintain let alone increase income per capita.


viii The Economist: Knowledge workers are the new capitalists, 1 November 2001 http://www.ebusinessforum.com/index.asp?layout=rich_story&doc_id=4772&categoryid=&channelid=&search=knowledge+workers

ix Workforce participation is measured as the labour force participation rate, defined as the number of people in the labour force (i.e. either employed or unemployed) as a proportion of the number of people of working age. Australia’s labour force participation rate has increased slowly since 1983 from 60.4% to 64.8% in August 2005, which is the highest level of participation on record.


xii ibid and OECD Education at a Glance 2005

xiii See Bill Shorten’s Sydney Institute speech, www.awu.net.au/national/speeches/

xiv OECD Science, Technology and Industry Scoreboard 2005. On average, 28% of persons employed in the OECD area had a tertiary-level degree in 2003. Canada and Japan (over 40%) and the United States (38%) ranked well ahead of Australia at 32 %.

http://lysander.sourceoecd.org/vl=1955533/cl=31/nw=1/rpsv/scoreboard/b04.htm

xv HECS and opportunities in higher education: a paper investigating the impact of the Higher Education Contributions Scheme (HECS) on the higher education system, by Aungles, Buchanan, Karmel and MacLachlan. AND Expansion in higher education during the 1990s: effects on access and student quality, by Martin and Karmel.

xvi OECD Science, Technology and Industry Scoreboard 2005. Australia averaged 4.9 per cent per annum growth in employment of tertiary level graduates versus 4.0 per cent for the OECD as a whole. http://hermia.sourceoecd.org/vl=836102/cl=37/nw=1/rpsv/scoreboard/b04.htm
We need once again a new independent government. 

But instead of working with the practitioners, the Government sets up its own separate service delivery mechanism - the Australian Technical Colleges. I think that most commentators remain to be convinced that this is the best use of scarce public funds when so much more could be achieved in partnership with the States and the existing TAFE system. A key element of standardisation is the development of a marketed, inexpensive and feasible systems to recognise and build on prior learning.

As Mark Wooden of the Melbourne Institute has said, “the Government should have a vested interest in ensuring collective bargaining continues to flourishes if it believes, as it is stated so often in the past, that enterprise bargaining has been fundamental to the productivity gains of the 1990s. ‘Australia’s Industrial Relations Reform Agenda, paper delivered by Mark Wooden to the Australian Conference of Economists, Melbourne, September 27, 2003.’”

The current system works. Chiquita - the leading producer and marketer of mushrooms in the Asia-Pacific - has negotiated an EBA with the AWU covering 120 casual full time employees supplemented by a 200-300 labour hire workforce. In return for flexibility under the EBA for Chiquita, employees benefit from guaranteed conditions including redundancy, long service leave, annual leave and penalty rates. Because of its EBA Chiquita has high worker retention rates and worker productivity. That is a win-win outcome. Chiquita has become an employer of choice.


Defining the Duties Of the American CEO, By Peter F. Drucker

http://www.careerjournal.com/columnists/perspective/20050124-fmp.html

US economist Richard Florida’s definition of the creative class is individuals working in fields as diverse as science, engineering, architecture, software, art and design, fashion, music and entertainment - the human capital engine of future economic growth. Heinz Professor of Economic Development at the Carnegie Mellon University and author of the groundbreaking book the “Rise of the Creative Class”.

xxv The Discipline of Innovation, http://polaris.umuc.edu/~fbetz/references/Drucker.html

We can learn from successful sectors as diverse as mineral exploration, wine and health care to develop innovative industries in other areas of the economy. And the Western Australian Government’s International Centre for Health Care Solutions – known as e-med - is developing a range of equipment to improve health care facilities in remote locations (eg, wound care and x-rays).

We need once again a new independent government institution to develop economic policy that supports long-term independent research such as the Economic Planning Advisory Council

Recent B-HERT Publications

As a unique group of leaders in Australian business, professional firms, higher education and research organisations, the Business/Higher Education Round Table (B-HERT) sees as part of its responsibility the need to articulate its views on matters of importance germane to its Mission. From time to time B-HERT issues Papers in this context – copies of which are available from the B-HERT Secretariat at a cost of $9.90 (GST incl.) per copy.


B-HERT Paper No. 8 – (July 2004) - THE FACTS: Higher Education in Australia

A compendium of statistics on higher education. The purpose of the report is to present some key relevant perspectives, statistics, trends and comparative data. The accurate and broad-based content of the report should help those in the higher education sector gain an informed view.

B-HERT Paper No. 7 (February 2004) – The Knowledge-Based Economy: Some Facts and Figures

An update to B-HERT Paper No. 4 which provides some useful and interesting comparative data on Australia’s relative global position within the context of the knowledge-based economy. ($7.70 per copy)

B-HERT News

No. 23 March 2006 Emerging Skills–2020 and Beyond
No. 22 July 2005 The Humanities and Business
No. 21 March 2005 Case Studies in Regional Engagement between Post-Secondary Education and Business
No. 20 July 2004 The Changing Education Needs for the Professions
No. 19 March 2004 The Challenge of the Private Providers
No. 18 November 2003 Improving Teaching and Learning in Universities
No. 17 July 2003 Regional Provision of Higher Education
No. 16 April 2003 Developing Generic Skills: Examples of Best Practice
No. 15 November 2002 Productivity in the Higher Education Sector: What Does it Mean?
No. 14 July 2002 Excellence in Collaborative R&D
No. 13 March 2002 Vocational Education and Training (VET)
No. 12 October 2001 The Need for a Stronger Entrepreneurial Culture in Australia
No. 11 July 2001 The Knowledge Economy & Knowledge Management
No. 10 March 2001 Business, Ethics, Values and Education
No. 9 November 2000 The Triple Bottom Line: Shareholders, Society, Sustainability
No. 8 July 2000 Populate or Stagnate: Australia 2050
No. 7 March 2000 The Business of Education for Business
No. 6 October 1999 Lifelong Learning in the New Millennium
No. 5 July 1999 Australia – The Information Economy
No. 4 March 1999 Leadership
No. 3 October 1998 Innovation
No. 2 June 1998 Science Education and Science Research in Australia
No. 1 March 1998 Inaugural Issue
Applications were sought early last year and were judged by an experienced panel of judges comprising:

- Professor Leon Mann, Director, Centre for R&D Leadership, The University of Melbourne (Chairman)
- Dr Annabelle Duncan, Associate Director & Chief Operating Officer, Bio21 Institute
- Dr Bob Frater AO, Vice-President for Innovation, ResMed Ltd
- Mr Peter Laver AM, Chairman, Australian Building Codes Board and Vice President, Australian Academy of Technological Sciences and Engineering
- Dr Jane Munro, Head of College & CEO, International House, University of Melbourne
- Dr Peter Scaife, Director, Centre for Sustainable Technology, University of Newcastle

B-HERT wishes to acknowledge the generous support of the following organisations:

CRITERIA FOR ASSESSMENT

1. **Innovation** – has the project or program produced new products or services; how innovative is it in its concept or idea, design, delivery or content; what new barriers has it surmounted; what new challenges has it identified?

2. **Strength of Relationship** – (a) what is the extent of involvement of the partners? (b) how has this grown over the life of the project or program? (c) how do the partners work together in a productive partnership? (d) are there obstacles and barriers the partners have had to overcome to make the collaboration work? (e) what other spin-offs have there been from the project or program for participating organisations?

3. **Outreach Inclusion** – has the project or program attracted new participants since its inception; has it become a model for other projects or programs?

4. **National Benefits** – these may be economic, financial, social, educational or community benefits: may include for example, growth in exports, creation of new jobs, outreach and provision of services to new community sectors and participants, and so on.

5. **Cultural Impact** – what impact has the project or program had on the cultures of the participating organisations? What changes have occurred in what is done and the way it is done in the participating organisations? What changes have there been in attitudes, behaviour or values in the participants?

The Awards were presented by the Hon Dr Brendan Nelson MP, Minister for Education, Science and Training, at a gala dinner at the Shangri-la Hotel in Sydney, on Tuesday, 22 November 2005.
Winning entries were:

Best Research & Development Collaboration

All winners are pictured with the Hon Dr Brendan Nelson MP, Minister for Education, Science and Training and Rob Stewart, President, B-HERT.

Winner: University of Newcastle and Ludowici MPE  
Title: Particle Size and Density Separations using the Reflux Classifier

There is a considerable need by industry for efficient separation of particles either on the basis of size or density. This need is especially evident in the coal and minerals industries where it is increasingly necessary to recover valuable product from lower quality deposits. This program of research has been concerned with the development of the Reflux Classifier, a fluidised bed technology that incorporates parallel inclined plates to effect a significant increase in the solids processing rate, while also increasing the efficiency of the separation. Following the establishment of an R&D agreement between the University of Newcastle and Ludowici MPE, a parallel program of fundamental and applied research was undertaken, resulting in the trial of a pilot plant and full scale proto-type. This collaboration has culminated in the export of five full-scale 120 tph separators, and considerable on-going national and international interest from industry.

Best Education & Training Collaboration

Winner: Victorian Department of Human Services, La Trobe University, Macfarlane Burnet Institute for Medical Research & Public Health, Melbourne Health, Victorian Health Promotion Foundation (VicHealth), Monash University, The University of Melbourne, National Public Health Partnership, Victorian Public Health Education & Research Council and Jesuit Social Services

Title: Victorian Public Health Training Scheme

The Victorian Public Health Training Scheme (VPHTS) is a work-based education and training collaboration which has made a unique contribution to capacity building within the public health system. The five participants selected each year, are given four-month placements over a two year period in a wide range of public health settings: the Victorian Department of Human Services, public health agencies, research institutions, non government service providers and academic research institutions. All partners in the collaboration are involved from day one in the selection, placements, supervision and examination of academic work of participants. VPHTS equips the participants with the skills to access and evaluate relevant information and advice in order to make sound, informed policy decisions and to make the economic case for public health research and practice. It also prepares them to potentially become the decision-makers and public health leaders of tomorrow who will have to deal with the changes and uncertainties confronting Australian society.
Heritage Archaeology in Australia is about building long-term collaborations in teaching and research between university departments, state and Federal heritage agencies, and private heritage consultancies so that we can develop and deliver world’s best practice outcomes in the Australian heritage management industry. In its initial iteration, the Archaeology Program at La Trobe University (a nationally significant provider of undergraduate and postgraduate teaching, and of internationally significant research) and Godden Mackay Logan Pty Ltd (a major heritage consultancy) have collaborated on two major urban archaeological excavations to produce management and training outcomes that have attracted international interest. They have also created innovative subjects in heritage archaeology at the tertiary level and produced (in collaboration with Heritage Victoria) a teaching kit to support school teaching in Australian history, and both museum and private sector exhibitions.

Australian Catholic University, St Vincent de Paul Society – Archdiocese of Sydney and Mission Australia

Title: The ‘Clemente’ Program

The ‘Clemente’ program, delivered in a community setting, is the first tertiary education program offered in Australia for homeless people. Participation assists those who are isolated and living in poverty to become more active community participants with a view to exiting homelessness. The program seeks to improve the quality of life for homeless people who normally live in conditions that adversely affect their mental and physical health. The benefits for the homeless people include an increased sense of self-efficacy, achievement and autonomy and potentially overcoming their sense of isolation and frustration. The collaboration created as a result of this unique partnership between a community (St Vincent de Paul Society) and an educational service (Australian Catholic University) provides an innovative opportunity to enhance the well-being and social connectedness for homeless people. Other community and educational services are learning from the inter-organisational capacity developed through the implementation of this program.

Dr Peter Howard, Senior Lecturer, Australian Catholic University

Professor Richard Mackay AM
Managing Director, Godden Mackay Logan

La Trobe University and Godden Mackay Logan Pty Ltd

Title: Heritage Archaeology in Australia

Heritage Archaeology in Australia is about building long-term collaborations in teaching and research between university departments, state and Federal heritage agencies, and private heritage consultancies so that we can develop and deliver world’s best practice outcomes in the Australian heritage management industry. In its initial iteration, the Archaeology Program at La Trobe University (a nationally significant provider of undergraduate and postgraduate teaching, and of internationally significant research) and Godden Mackay Logan Pty Ltd (a major heritage consultancy) have collaborated on two major urban archaeological excavations to produce management and training outcomes that have attracted international interest. They have also created innovative subjects in heritage archaeology at the tertiary level and produced (in collaboration with Heritage Victoria) a teaching kit to support school teaching in Australian history, and both museum and private sector exhibitions.
**Best Collaboration involving a CRC – Research & Development or Education & Training**

**Winner:** Charles Darwin University, Northern Territory Department of Health and Community Services, Co-operative Research Centre for Aboriginal Health and Banbins Productions

**Title:** Sharing the True Stories

High morbidity and mortality among Aboriginal people in north-central Australia give urgency to the need to improve inner-cultural communication and education in health services delivery. Sharing the True Stories (STTS) research project (2001-2005) involved collaboration between the Co-operative Research Centre for Aboriginal Health, Charles Darwin University, Northern Territory Department of Health and Community Services, other stakeholders, industry agents, and client and community groups. Aboriginal client groups, Aboriginal interpreters, health staff, and research consultants worked together within a Participatory Action Research framework, to identify and address problems in communication and education in NT renal and hospital services.

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**Best International Collaboration – Research & Development or Education & Training**

**Winner:** Cooperative Research Centre for Advanced Composite Structures, RMIT University and Airbus Deutschland GmbH

**Title:** Composite Defect Modelling Project (CDMP)

Commercial aircraft manufacturers face the competing demands of increasing performance while reducing costs. To meet this challenge, advanced fibre composite materials are being more widely applied, comprising up to 50% of the structure of the latest aircraft. In addition to weight savings, composites offer many advantages, such as increased fatigue and corrosion resistance, but are susceptible to defects and damage introduced during manufacture or service. In this project, a suite of “next generation” modelling tools were developed to simulate the effect of common defects and damage experienced over the lifespan of an aircraft. The tools are now being used by Airbus to improve design confidence and safety, while reducing the cost of manufacture and testing. This will lead to dramatic reductions in design and certification time and cost, establishing commercial advantage for the partners, with the savings ultimately passed onto airlines and their customers.
Winner: La Trobe University, Bendigo, OlivOz, Alfa Laval and Corporazione del Mastri Oleari

Title: Aggregated Olive Processing and Research Cluster

Businesses in regional areas tend to be small and do not maximise value chain opportunities. La Trobe University has actively collaborated with businesses to establish and support networks, clusters and new businesses to identify and develop import-replacement and value-adding opportunities to grow businesses and the region; provide opportunities for applied research and commercialisation; provide employment/placement opportunities for graduates and undergraduates.

One program has resulted in an olive processing cluster that locally value-adds, and has established a $33 000 per annum R&D fund to seed fund business-university collaborative research. Over 160 local olive growers have clustered with La Trobe University and Alfa Laval to locally produce high quality extra virgin olive oil, with one label being Latitude 37. The program provides research, teaching and student placement opportunities in marketing; business; supply chain; food technology and agribusiness.

Note your diary –

Applications for this year’s Awards for Outstanding Achievement in Collaboration in Research & Development and Education & Training will be called in May 2006.
2005 Award for

**The Best Entrepreneurial Educator of the Year**

**MAJOR SPONSOR**

PURPOSE

To recognise the importance of education in the process of developing and nurturing entrepreneurs; and to showcase best practice in entrepreneurial education.

**CRITERIA FOR ASSESSMENT**

1. Effective involvement of industry in the design, implementation and evaluation of entrepreneurial educational activities.
2. Encouragement of students in the practice of entrepreneurship.
3. Is the educator’s work a model for others?
4. Demonstrable outcomes of the educator’s work – development by students of new products, processes or services.
5. Has the educator’s work made a difference to the attitudes, self-esteem, behaviour, life chances, values and employment outcomes of their students?

The winner of the 2005 Best Entrepreneurial Educator of the Year:

**Associate Professor Chris Collet**  
Course Co-ordinator, Bachelor of Biotechnology Innovation  
Senior Lecturer, Biochemistry and Molecular Biology  
Queensland University of Technology

Dr Collet has nearly 30 years of research experience in laboratories in Australia and overseas including leading research groups on projects in molecular biology and biotechnology. Since 1984, he has initiated and managed research projects related to the discovery and utilisation of natural resource products in biotechnological application from insects, plants and animals. Recent projects on the molecular biology of marsupial lactation provided opportunities for novel constructs in mammary gland bioreactor systems while projects on the peptide growth factors and neurotransmitters in fish have provided growth stimulant peptides for aquaculture. Lately, Dr Collet has explored systems for the low-cost production of diagnostic, industrial and research proteins through the use of crops such as microalgae, banana and sugarcane as bioreactors.

Since joining QUT in 1995, Dr Collet has played a major role in innovative curriculum development, course design and implementation related to the Bachelor of Applied Science course and the new Bachelor of Biotechnology Innovation. The latter course is a unique and innovative approach to educating students in the business and science of biotechnology aimed at producing the next generation of biotechnology entrepreneurs.

Note your diary – applications for this year’s Award for Best Entrepreneurial Educator will be called in May 2006.
B-HERT has established a register of those from universities and research organizations (CSIRO, DSTO, ANSTO, and medical research institutes) who are interested in becoming non-executive directors on company boards. Companies will be able to access this register and follow-up with individuals whom they see as potentially suitable.

There is probably not a single university governing body in Australia which does not include at least one business person. Generally there will be several. Conversely, there are very few corporate boards which include academics, scientists, or researchers.

The following quotes illustrate why B-HERT has established the Directors Register.

‘We still have got something that looks remarkably like a private school club. It’s less that it was, but it needs to be broken up... you can change a few directors. I think that’s long overdue in terms of gender balance and class background.’

Garry Weaven, Chairman, Industry Fund Services - BRW August 18, 2005

‘Everyone is saying we need new directors but few are prepared to give people a go. It’s a real catch - 22.’

James Strong, Chairman, Woolworths - BRW May 26, 2005

In the Jan 2005 issue of Company Director, the official journal of the Australian Institute of Company Directors, in an article on Corporate Governance, the comment was made, ‘We need to widen the pool of directors.... to include women, government, academics, HR people, industrial relations, communications and IT.’

Companies need to constantly expand their pool of non-executive directors, to diversify the collective talent around the board table, and to go outside the normal pool of likely candidates. It is frequently remarked that there is a shortage of quality directors in Australia.

Companies could gain valuable expertise by tapping into the university and research sectors.

Many companies, at board level, could profit from having a greater understanding of the true potential of the latest developments in science or technology.

It has become evident in recent times that most companies do not understand or appreciate the competitive value of their intellectual property. There are a couple of outstanding examples in Australia of companies who do realise and are devoting considerable resources to effectively exploiting their IP.

In addition to the organizations mentioned above the register will also include members from professional associations such as Engineers Australia (a member of B-HERT).

There are procedures to protect the privacy of those who put their names on the register.

The Register is open (free of charge) to companies, members and search firms who are seeking board members. These organisations do not get direct access to the Register. They specify to B-HERT the characteristics of the person they are looking for and B-HERT then searches the register for suitable people.

B-HERT then communicates this to the company or search firm and B-HERT plays no further role in the matter.

For those employed by B-HERT Members, for an annual fee of $50 plus GST, interested persons can register their profile, including details of current and past experience, with B-HERT. For those employed by organizations who are not members of B-HERT, the annual fee is $75 (plus GST).

The Register is an Internet based service which gives individuals complete control over their profile. Profiles can be updated at any time by accessing the register using individual passwords. Registrants can also easily remove their profile from the Register.

If interested go to the B-HERT website for further information, www.bhert.com
Commercialisation Expo 2006 is Australia’s premier event for bringing research organisations, industry and markets together to create tomorrow’s commercial successes. The event will showcase Australia’s R&D capabilities and commercial opportunities, allowing you to discover what’s hidden in the research sector.

Registrations are open to become a sponsor, an exhibitor, award entrant, delegate and more – we encourage you to take this opportunity to connect with your peers and network, challenge your perspective and be inspired by the innovation on display. Highlights of the Expo include:

**EXHIBITION**
The Exhibition is the hub of Commercialisation Expo 2006 and features general exhibition booths that provide a space to showcase your technology, services, and business. In addition, if you are a start-up venture and would like to promote your technology at the Exhibition, competitively priced collective Start-Up Booths are available.

**POSTER DISPLAYS**
A highlight of the Exhibition will be 300 posters showcasing the best innovation and technology Australia has to offer. Each poster comprises an A1 poster displayed in the Exhibition Hall and includes a Business Opportunity Summary and contact details. Your poster will also be featured in the Big Book of Ideas, and the Posters are your gateway to compete for the prizes.

**PETER DOHERTY PRIZE FOR INNOVATION**
The premier prize for the most outstanding eligible opportunity is the Peter Doherty Prize for Innovation, which is valued at $100,000 of cash and in-kind services. Other prizes are available to entrants in the competition. These include $10,000 sector-specific and state-based prizes.

**COMMERCIALISATION CONFERENCE**
The conference program has been designed with a clear outcome in mind – to identify and assess the challenges facing research organisations and businesses when they connect and commercialise.

The speakers will draw on both local and global knowledge and provide an assessment on future trends and forecasts for activity in the innovation investment sphere. The conference will:

- Offer a blend of facilitated panel discussions, roundtable sessions and presentations
- Bring together global and local speakers from diverse business and research backgrounds
- Showcase business models that work
- Highlight emerging opportunities
- Present Australia’s best in innovation

In 2003, the inaugural Commercialisation Expo (then known as the Commercialisation Forum and Fair of Ideas) exhibited technologies that attracted over $40 million in investment and this figure continues to grow. Overall, over 200 technologies entered the Peter Doherty Prize and dozens of these were the subject of agreements. Expo 2006 will host more exhibitors, more technologies and more delegates.

Visit [www.expo2006.com.au](http://www.expo2006.com.au) to register your interest. Early bird registration end on Friday 21st April and Exhibition booths are over 40% sold at time of print, so get in early!

Commercialisation Expo 2006 is supported by Host Sponsors KCA and AIC, and Foundation Sponsors Department of Education, Science and Training, Group of Eight Limited and the Victorian State Government.
When B-HERT agreed, in early 2000, to support the introduction of the Students in Free Enterprise (SIFE) program to Australia, it was seen by our Board simply as a worthy program that embodied an aspect of our purpose in pursuit of improved performance of both business and higher education for the benefit of Australian society.

While always believing that B-HERT would be discriminating and astute in the selection of causes to champion, it was little thought that the organisation would be so prescient in this regard. But as has now been made clear, a part of the Government's vision for the future of higher education is to encourage and reward universities precisely for their engagement in and with the wider community.

As members will recall, the SIFE program was established by the business community to encourage university students to undertake service learning by empowering others through the creation of economic opportunity. In the course of a typical SIFE project, students not only confirm their own learning by the teaching of others but also master the generic rudiments of project management.

At campuses around Australia, students are preparing to deliver projects on which they will report at the 2006 SIFE Australia National Competition, to be held at the Brisbane Hilton on 7 & 8 July for 32 university teams. The final round of judging will be chaired by Roger Corbett AM and the Champion Team will represent Australia at the sixth SIFE World Cup in Paris in September 2006.

University and corporate members of B-HERT who are not already involved in SIFE are strongly encouraged to contact the CEO of SIFE Australia, John Thornton, on 0417 811877 or by email to john.thornton@sifeaustralia.org.au for more information on opportunities provided by the program.

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**THE STUDENTS IN FREE ENTERPRISE PROGRAM: COMMUNITY ENGAGEMENT IN ACTION**

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**DIARY NOTES**

**UPCOMING EVENTS**

**Enterprise Summit**
Philanthropy – Partnering Tomorrow’s Universities, a Critical Source of Income

*When*: 17 May 2006  
*Where*: The Sheraton on the Park Hotel, Sydney

*Cost*: $539.00 incl GST (refreshments and lunch included)

*Programme and registration details are available at www.bhert.com*

**Education Summit**
Tomorrow’s Universities - The Need for Change?

*When*: 7 June 2006  
*Where*: ANZ Pavilion, Level 8, The Arts Centre, 100 St Kilda Road, Melbourne

*Cost*: TBA

*Programme and registration details will be available at www.bhert.com once details are confirmed.*

**Information and Reference Resource**

For presentations and programme contents from previous conferences, and forums please visit our event/past events page at www.bhert.com
The purpose of the Business/Higher Education Round Table (B-HERT) is to pursue initiatives that will advance the goals and improve the performance of both business and higher education for the benefit of Australian society. B-HERT is the only body where leaders of Australia’s business, research, professional and academic communities come together to address important issues of common concern, to improve the interaction between Australian business and higher education institutions, and to help guide the future directions of higher education.

In pursuing this mission BHERT aims to influence public opinion and government policy on selected issues of importance.

Mission Statement

B-HERT believes that a prerequisite for a more prosperous and equitable society in Australia is a more highly-educated community. In material terms it fosters economic growth and improved living standards - through improved productivity and competitiveness with other countries. In terms of equity, individual Australians should have the opportunity to realise their full social, cultural, political and economic potential.

Membership of B-HERT comprises Australian universities, corporations, professional associations, the major public research organisations (Commonwealth Scientific and Industrial Research Organisation and Australian Nuclear Science and Technology Organisation).

B-HERT pursues a number of activities through its Working Groups and active alliances with relevant organisations both domestically and internationally. It publishes a regular newsletter (B-HERT NEWS), reporting on its activities and current issues of concern relevant to its Mission.