

strengthening people and skills

Human capital is central to innovation. Throughout this Review, there has been substantial support for the notion that investing in our people will be an important component of building our strength in innovation.

Moreover, the Productivity Commission has acknowledged that high quality human capital is an essential foundation for Australia's innovation system.¹ A highly-skilled workforce is essential not only for the generation and application of new knowledge, but also to use and adapt the knowledge produced elsewhere.

Formation of high-quality human capital requires attention at all levels of education from early childhood education and schooling, through vocational education and training, and higher education, and into the workplace. 'Innovation is fundamentally a people-driven exercise and a nation's capacity to innovate is inextricably linked to the breadth and quality and focus of its education and training systems.'²

In the Australian Government 2020 Summit final report of May 2008 the Productivity Agenda stream agreed to the goal of:

focusing on human capital through early childhood development, world-class education, skills formation and innovation and the need to equip all Australians through an education and training system that leads the world in excellence and inclusion.

The Summit agreed that a 'substantial lift' in research and development effort and a commitment to innovation will be the basis for Australia's future.

¹ Productivity Commission, Public Support for Science and Innovation, March 2007.

² Department of Education, Employment and Workplace Relations - Submission no 266

Many submissions to this Review emphasised the importance of an education system that equips people with the skills for innovation.¹ Furthermore, this included support for equipping people with skills in innovation at all levels of learning, from early childhood right through to adult education.

Current government reform processes

The Panel noted the substantial reform agenda of the COAG and, in particular, the Productivity Agenda Working Group. This group has identified priority areas for reform including early childhood development, schooling and skills and workforce development.

Later this year, COAG will consider important reforms that focus on giving children the best possible start in life and on delivering early childhood services such as health, child care, education and family support.

Reforms in schools will aim to support all teachers and school leaders in lifting the ability of all young Australians to engage, learn and achieve in schooling, and ensure they are well prepared for life and further learning. We note that arrangements are in train for a national curriculum board to be established and that consultation on the development of a national curriculum is underway. We also note that the government has a commitment to school-level reporting of literacy and numeracy results. We welcome transparent school-level reporting as a means of identifying problem areas and learning from the most successful schools.

In the vocational education and training sector, the new wave of national reform will focus on the users of the vocational education and training system, including in relation to competition, contestability, regulation, quality assurance and consumer information.

In the higher education sector, the Review of Australian Higher Education is examining and reporting on the future direction of the higher education sector, its fitness for purpose in meeting the needs of the Australian community and economy and the options for ongoing reform.²

¹ Council for the Humanities, Arts and Social Sciences – Submission no. 481; Education.au – Submission no. 347; Google – Submission no. 619; Graham, Philip – Submission no. 574.

² More information on the Review of Australian Higher Education, including Terms of Reference, are available at <http://www.dest.gov.au/HREview>

The Bradley Review has some acknowledged overlaps with this Review of the National Innovation System. For example, it is examining whether the education system is capable of:

- contributing to the innovation and productivity gains required for long-term economic development and growth; and
- ensuring that there is a broad-based tertiary education system producing professionals for both national and local labour market needs.

We have been careful not to duplicate the work underway in these significant areas of national human capital and education reform processes.

Rather we have recognised the substantial human capital reform agenda of COAG and the broader education reform agenda, and expressed strong support for having innovation considered as part of those processes.

Innovative people

Innovation covers the space where creativity and practice meet and involves both problem definition and problem solving. A truly creative and innovative society requires a broad range of inputs spanning all areas including science, technology and engineering, as well as the creative arts.

Talk about innovation can be very abstract, but tends to become quite specific and stereotypical when talking about the innovator and entrepreneur — the mad inventor in a lab coat, or the white-shoed commercial hustler. Likewise, there is a tendency to imply that a special ‘creative class’ of people exists to whom the general population should pay due deference.

Rather than segmenting innovation into self-contained silos that split the creative arts and humanities from the physical sciences, it would be wise to heed the Prime Minister’s closing remarks to the Australia 2020 Summit:

This false divide between the arts and science, between the arts and industry, between the arts and the economy: we’ve actually got to put that to bed. As if creativity is somehow this thing which only applies to the arts, and innovation is this thing over here which applies uniquely to the sciences, or technology, or to design. This is actually again a false dichotomy: it’s just not like that. Our ambition should be to create and to foster a creative imaginative Australia because so much of the economy of the twenty-first century is going to require that central faculty.

Each member of society has the potential to contribute to innovation and this should be reflected by the frameworks for, and investment in, education and human capital. Better understanding of the connections and commonalities between science and the arts is also required to maximise Australia's collaborative creative potential. After all, both science and the arts are concerned with the endeavour of making sense of apparently random phenomena, to explain why things are as they are or could be. It is instructive to recall that Charles Darwin was first and foremost an obsessive collector, and it was this obsession with taxonomy that generated his world-changing insights about the evolution of species and living systems. Today he may have been a director of a museum.

The other great cultural divide is between the realm of the conceptual, the intellectual, and the artisan and craftsman. The role of crafts and trades in innovation has been massively neglected, particularly in the important areas of continuing incremental innovation in the workplace. Often major breakthroughs come from seemingly little ideas or insights arising from hands-on engagement, and from learning by doing. There is a tendency to forget that much of the scientific progress since the Renaissance has depended on the innovative development of new tools and instrumentation. There is an increasing need for multi-disciplinary practice and collaboration in virtually all areas, and there is a need to learn how to do it better.

Australia's innovation policy needs to acknowledge and incorporate the role of the creative and liberal arts. One of the international advisers to the Review, Professor Richard Lester from the Massachusetts Institute of Technology, discussed the different modes of innovation associated with analytical problem solving and what he terms the interpretive or 'solution-seeking' processes associated with significant problems. These interpretive processes are most useful when the solutions are unknown. This is where we need to call on the creative imagination and the distinctive skills associated with the liberal and creative arts.

Key areas of challenge

The significance of human capital to innovation was raised throughout the Review. This report focuses on just three of the themes to emerge: Maths/Science/Technology; Creative Arts; and Teacher Quality.

Maths/Science/Technology

Maths, science and technology are frequently associated with innovation. Knowledge and skills in these areas are important for Australia's current and future productivity and prosperity.

A quality education in science, maths and technology is needed to produce the new generation of innovators and technology-literate citizenry to find solutions to the societal and global issues that we face. Just as countries grow faster when their citizens have more years of education, they also tend to enjoy more rapid economic growth when their population is more mathematically literate.¹ An increasing share of jobs in the Australian labour market require a familiarity with maths, science and technology. The more comfortable young people are with these skills, the more likely they are to succeed in the labour market of tomorrow. Yet there is evidence that the mathematical skills of Australian teenagers are no better today than in the mid-1960s.² We need to do more to improve the technical and technological skills of Australian school graduates.

Like many other countries, Australia faces challenges in building capability in science, technology, research and innovation. The challenges are diverse and relate to a range of issues including the supply, as well as retention, of teachers, students and career makers in science and related fields. This is an issue for Australia as we know that significant skills shortages across science, engineering and technology fields are hampering the advancement and quality of this sector of the innovation system and are predicted to worsen in future.^{3,4,5}

The *Opening up Pathways* report commissioned by the Department of Education, Employment and Workplace Relations reviews the literature on supports and barriers to science, technology, engineering and mathematics engagement at the transition from primary to secondary school.⁶ This report found clear evidence of declining participation in mathematics and physical sciences at the upper secondary and tertiary level, as well as a ‘current and looming crisis’ in the supply and quality of teachers for these subjects.

There are numerous policy initiatives to help address these issues, for example through initiatives such as Primary Connections, Science by Doing, Scientists in Schools,⁷ and the Computers in Schools Program. Yet much of what has been done in this area has not been rigorously evaluated, and promising options remain unexplored.

1 Hanushek, E. A. and Kimko, D. D., Schooling, Labor-Force Quality, and the Growth of Nations, *American Economic Review*, 90(5), 1184–1208. 2000.

2 Leigh, A. and Ryan, C., How Has School Productivity Changed in Australia?, working paper, Australian National University, 2007.

3 DEST, Audit of Science, Engineering & Technology Skills Summary Report. July 2006.

4 Australian Academy of Science, Mathematics And Statistics: Critical Skills For Australia’s Future. The National Strategic Review of Mathematical Sciences Research in Australia. 2006.

5 PMSEIC Working Group on Asia, Strengthening Australia’s Position in the New World Order, Canberra. 2006.

6 Opening up pathways: Engagement in STEM across the Primary-Secondary school transition, June 2008.

7 Primary Connections is a program supported by the Australian Academy of Sciences and DEEWR which is a comprehensive primary science program which aims to enhance primary school teachers’ confidence and competence for teaching science; Science by Doing is a pilot program funded by DEEWR and managed by the Academy of Sciences designed to promote active learning and stimulate student interest; Scientists in Schools, also funded by DEEWR, allows for scientists to work in partnership with teachers to foster links between school and science communities.

In considering how best to teach the skills that underpin innovation, we should be open to innovative new strategies, including new learning programs, better rewards for maths and science teachers, and late-career pathways into teaching for scientists and mathematicians.

Overall, initiatives designed to boost our knowledge and skills in maths, science and technology are strongly supported. Furthermore, the Panel acknowledges the importance of including maths, science and technology in the broader national education reforms, and encourages the government to pursue ambitious reforms to improve our performance in these areas.

Creative Arts

Many submissions discussed the need to integrate creativity, cultural studies, the arts and design into curriculum to produce the best innovators.

According to the Australian Bureau of Statistics, Australia produces some \$50 billion of cultural goods and services each year. The visual and performing arts rely very heavily on innovation, with new television programs, plays, music, and films making up a relatively large share of annual creative arts output. They join new digital industries, and services such as events management. All are intensely competitive global industries, in which both originality and high levels of technical skill are required for success. Competence alone is rarely enough. Training, a research base, and appropriate technological support are a necessary part of the package.

The particular demands of the visual and performing arts mean that the large classes used to educate students in other fields of study are inappropriate. Intensive small group or one-on-one instruction is necessary, along with the relevant infrastructure and technologies. Funding for future innovators in the visual and performing arts varies enormously from institution to institution. There is no national approach to essential training for these industries, nor capacity to train to an appropriate level all the talented students seeking to participate in the creative arts. The institutions funded through the Department of Education, Employment and Workplace Relations (DEEWR) receive much less per-student funding than institutions funded by the Department of Environment, Water, Heritage and the Arts (DEWHA).¹ This makes it very difficult for the DEEWR-funded institutions to match the education offered by the DEWHA-funded institutions. It means that opportunities to participate in highly-funded specialist training are few and confined to a handful of institutions.

¹ Victorian College of the Arts submission to the Bradley Review of Australian Higher Education

In the time available, this Review cannot examine the complex and important questions around funding models for training in the creative arts. Suffice to say, there is a need to review present arrangements with the aim of ensuring opportunities for more qualified students to participate in appropriately - supported tertiary training in the creative arts. In recent years the Australian Government has invested additional funding in fields such as engineering and mathematics, recognising their centrality to innovation. The same approach is required in an important area of Australian success - the creative arts - through more equitable distribution of opportunities, greater research opportunities, and an underlying funding model which reflects the real cost of high-quality training. Sound coordination between agencies is essential to this end and will be critical to the development of a consistent policy framework.

Capitalising on the contribution of the creative and liberal arts to Australian innovation presents a challenge. The Panel recognised the need to bring together the learned academies, the professional and representative bodies in the arts, humanities and social sciences and public agencies to navigate a way for the creative sectors to realise their potential as a platform for national innovation. This is where creative and human capital can drive productivity, with both social and economic benefits for Australia.

Teacher Quality

Many Australians can remember a teacher who made a valuable difference in their lives. Every day, talented teachers across the country open the eyes of students to particular subjects, or to a love of learning in general. Many of our greatest innovators chose their current path thanks to encouragement from one of their school teachers.

The challenge for Australia is ensuring that we have many talented teachers in our classrooms. High quality teaching is a key driver of student performance and better student results means more innovation. As a McKinsey report into the world's top school systems pointed out last year, three things matter most: '1) getting the right people to become teachers, 2) developing them into effective instructors, and 3) ensuring that the system is able to deliver the best possible instruction for every child'.¹ Yet some evidence suggests that the academic aptitude of new Australian school teachers has fallen over recent decades.² While this is an imperfect measure of teacher quality, it is consistent with the evidence on trends in teacher quality from other countries.

¹ McKinsey & Co, How the World's Best-Performing School Systems Come Out on Top, 2007, http://www.mckinsey.com/clientservice/socialsector/resources/pdf/Worlds_School_Systems_Final.pdf

² Leigh, A. and Ryan, C., How and Why has Teacher Quality Changed in Australia? Australian Economic Review, 41(2): 141-159, 2008.

Two factors appear to have been at the heart of the drop in teacher quality. First, average salaries of teachers have steadily declined, relative to all university graduates. This has been particularly true for women. As professions such as law and business became more attractive to talented young women, fewer chose the teaching profession. Naturally, there are still talented women in the teaching profession, but fewer today than in the past. Second, the degree of pay dispersion in most occupations has steadily widened. In most professions, a high-performing worker today earns substantially more than average. The uniform salary schedules that govern all public school teachers look increasingly anachronistic to today's talented young university graduates.

Delivering quality and relevant education in Australian schools is essential to ensuring that the nation maximises its innovative potential. While contemporary teaching methods and suitable curricula are essential aspects to achieving high quality education outcomes, attracting, training and retaining the best and brightest teachers is a crucial precursor and foundation. A recent report on the quality of Australian schooling undertaken by the Council for Australian Federation reported that the quality of teaching is the largest in-school determinant of variation in student achievement.¹ Value-added results from Queensland suggest that the top 10 percent of teachers are twice as effective as the bottom 10 percent.²

The importance of high-quality teaching has been identified as part of the reform under the COAG. In March 2008, COAG agreed to develop a new schools reform plan for the 21st century. A key priority is to improve teacher quality in Australian schools by providing national leadership in high priority areas of teacher professional learning and development. Other reform priorities are increasing the incentives for high-performing teachers to serve in disadvantaged schools, improving incentives for the most talented teachers to stay in the profession, and creating alternative career paths into teaching. At this stage, it is not clear how vigorously these priorities are being pursued.

1 The Council for Australian Federation, September 2007, <http://www.caf.gov.au/Documents/TheFutureofSchoolinginAustralia.pdf>

2 Leigh, A., Estimating Teacher Effectiveness From Two-Year Changes in Students Test Scores, working paper, Australian National University, 2007.

Recommendation 5.1:

On the basis that high quality human capital is critical to innovation, support:

- *the human capital focus of the COAG national reform agenda;*
- *the broader national education reforms, and their central focus on raising teacher quality;*
- *innovation being considered as a key element of these and future substantial national reforms;*
- *a process to review currently inconsistent funding models for tertiary training in the creative arts, with the aim of producing a nationally consistent policy; and*
- *an examination of the most innovative educational reforms being pursued in other countries to benchmark our efforts.*

Workplace innovation

Innovation does not happen with a ‘eureka’ moment in a laboratory; it only happens when an idea is put to work. And innovative changes, from small to big, happen on the factory floor, in the office, or in the paddock. The often unglamorous innovation and performance breakthroughs from new ideas that drive productivity gains occur in workplaces and within work teams. Many submissions made the case that the firm should be the core focus in the discussion of innovation; the firm is where innovation happens.

Following on from the foundation of a skilled, motivated and engaged workforce, Australia’s workplaces must adequately nurture and tap into the creativity and skills of workers at all levels. There are a number of ways to open up the skills pool in Australia’s workplaces and some of these are discussed below.

There is evidence in the literature for the linkage between training and innovation in the achievement of productivity growth, as well as between training and the ability of firms to absorb new ideas and technological innovation.¹

Challenges raised during the Review range from the lack of attention

¹ Laplagne, P. and Bensted, L., The Role of Training and Innovation in Workplace Performance, Staff Research paper, December 1999; Dearden, L., Reed H., and Van Reenen, J., The Impact of Training on Productivity and Wages: Evidence from British Panel Data, The Institute for Fiscal Studies, London School of Economics, WP05/16, 2005; Innes, J., Education, Training and Productivity: Exploring the Linkages, The World Bank, 2005 (www.siteresources.worldbank.org/PGLP/Resources/John_Innes.ppt)

to ‘on-the-job training’ to the neglect of management education in workplace operations.¹ There are also systemic cultural problems which act as innovation blockers, and these include pervasive risk aversion, ill-designed and non-inclusive workplaces and the focus on the short-term at the expense of the longer term development of capabilities and continuing investment in people.

Building capacity for innovation in the workplace calls for a multi-faceted approach combining attention to the type and calibre of skills needed within the workplace including:

- mechanisms that promote and encourage continuing skills development and learning at both an individual and team level,
- management education for innovative workplace organisation, and
- strategies to build innovative and productive workplaces.

These challenges span government ministries, especially crossing between the Department of Education, Employment and Workplace Relations and the Department of Innovation, Industry, Science and Research. Indeed, many contributors to the Review noted the importance of better alignment between skills and innovation programs, whilst noting the foundational activity of Innovation and Business Skills Australia.

On-the-job training and up-skilling have characteristics of market failure because individual firms have less incentive to invest in training than is the social optimum, and there are significant public spillovers from any upgrading of the labour force. This is particularly true when labour markets are tight, and as career mobility becomes the norm for ‘knowledge workers’. If a firm invests in upgrading an employee’s skills there is a strong likelihood that another employer will reap the benefit as a free-rider. This non-excludability of the training benefit, however, enhances the overall skill pool for an industry and region.

The public policy objective here is twofold. First we want to promote greater investment in skill upgrading and development to achieve an outcome of increased firm productivity and innovativeness. The second objective is to support everyone in the workforce to be able to develop and hone their skills and talents over the course of their whole careers.

Innovative enterprises

Innovative enterprises and innovative workplaces are two sides of the one coin. Some would argue that they are identical, just highlighting a different facet of innovation.

¹ In addition to the issues raised in submissions, a Roundtable on Human Capital and Workplace Innovation was held in Melbourne on 2 May 2008, and there has been a continuing dialogue with both local and international industry leaders.

Innovation in firms focuses on the knowledge, business practices and management proficiencies that allow business enterprises to transform their product and service offerings, their capabilities and their ability to satisfy customer and market needs in novel and more imaginative ways than their global competitors, and so operate profitably over time.

Productivity in innovative enterprises results from creating new value by the smart application of knowledge that makes their businesses and capabilities distinctive in the marketplace. This type of productivity is transformative — it is not about cost-cutting, nor about doing more with less, nor about working people harder for longer.

Central to the success of innovative enterprises is their ability to create their own competitive advantage that rivals either fail to perceive or to which they are unwilling or unable to respond. Often this distinctive competitive advantage draws largely on the skills and tacit knowledge of their workforce and how well the enterprise organises and manages its people, processes and external relationships.

So, innovative enterprises and innovative workplaces are inextricably intertwined. Australia's innovation policy must act on the twin goals of both investing adequately in our people and their skills and in making our business enterprises the best they can be — innovative, globally competitive and sustainable.

Training, productivity and innovation

There is less known about the public return from investment in training than from investment in research and development. Although the literature is not extensive, links have been shown between training and innovation in the achievement of productivity growth, as well as between training and the ability of firms to absorb new ideas and technological innovation.

For example, an Australian Productivity Commission research paper in 1999 examined the links between training, innovation and labour productivity using the 1990 and 1995 Australian Workplace Industrial Relations Surveys.¹ The researchers concluded that:

Labour productivity growth appears to be enhanced by the joint introduction of training and innovation. Introducing innovation in isolation can promote labour productivity growth, although its returns are increased by the presence of training. Conversely, training is only of benefit to labour productivity growth if combined with innovation.

Deeper empirical studies have been conducted in Europe. One study

¹ Laplagne, P. and Bensted, L., The Role of Training and Innovation in Workplace Performance, Staff Research paper, December 1999

by expatriate Australian Lorraine Dearden found that work-related training is associated with significantly higher productivity:

A one percentage point increase in training is associated with an increase in value added per hour of about 0.6% and an increase in hourly wages of about 0.3%.¹

Furthermore, the connection between training and technology adoption and diffusion has been highlighted by The World Bank:

- Skills upgrading, technological change, and their interaction are major factors behind total factor productivity growth, because:
 - Skilled workers are better able to adapt to change and, therefore, better able to use new technology;
 - Presence of skilled workers creates incentives for companies to develop new technologies that are more skill-intensive;
 - Adoption and diffusion of existing technologies requires sufficient generalized level of education in the work force; and
 - Higher levels of education are needed to enable significant adaptations of existing technology.²

Comments such as these remind us of the importance of both a technically literate workforce and new creative skill sets like those embodied in design.

Management education

A challenging range of strategic, operational and integrative competencies are required to lead innovative businesses.³ The wide-ranging nature of these competencies reveals the extent of the management challenge. Many submissions and consultations raised the need to revisit the issue of management education and leadership skills that were flagged in the Karpin report, *Enterprising Nation*.⁴

Karpin's report identified five challenges facing Australia and its managers. These are:

- to develop a positive enterprise culture through education;
- to upgrade the capabilities of the vocational training and education sector;
- to capitalise on the talents of diversity;

¹ Dearden, L., Reed H., and Van Reenen, J., The Impact of Training on Productivity and Wages: Evidence from British Panel Data, The Institute for Fiscal Studies, London School of Economics, WP05/16, 2005;

² Innes, J., Education, Training and Productivity: Exploring the Linkages, The World Bank, 2005 (www.siteresources.worldbank.org/PGLP/Resources/John_Innes.ppt)

³ Dodgson M., Gann D. and Salter A., The Management of Technological Innovation: Strategy and Practice, Oxford University Press, Oxford, 2008.

⁴ Karpin, D., *Enterprising Nation: Renewing Australia's managers to meet the challenges of the Asia-Pacific century*, Industry Task Force on Leadership and Management Skills, Canberra, 1995

- to achieve best practice management development; and
- to reform management education.

While these challenges still stand, a lot has changed since. If anything the importance of management education in the arts of workplace innovation and organisation has increased markedly. We need to ask how the management challenges will change going forward.¹ The nature of workplaces will continue to change, and new inter-generational issues will come to the fore. A number of submissions questioned our managerial preparedness.²

The issue of managerial capabilities and skills also surfaced in the parallel reviews of the automotive industry and the textile, clothing and footwear industries. The *Review of Australia's Automotive Industry* reports on a major study of the management and organisational capabilities of SME automotive component suppliers. Its main finding is the need to lift management skills and capabilities.³ This is consistent with the general findings of other research, which identified a challenging range of strategic, operational and integrative competencies required to lead innovative businesses.⁴ The wide-ranging nature of these competencies reveals the extent of the management challenge. The competencies are providing the focus of significant international management training efforts in the private sector—in intermediary organisations such as commercialisation advisers—and increasingly amongst policy makers keen to understand the motivations and challenges of innovation in business. The capacity to develop these competencies needs to be expanded in Australia.

To explore these issues further, Deans of business schools could consider leading a discussion on management education and its role more broadly in education, training and innovation.

Continuing skills development

One strategy discussed with approbation at the *2020 Summit*⁵ was the idea of life long learning accounts. A life long learning account is a scheme whereby a worker accumulates learning 'credits' which can be drawn down for investment in eligible training and personal development, such as after-school tutoring or vocational training. Such a scheme would complement and be largely additional to the training investment which might be made at a firm level. At the Review's Human Capital and Workplace Innovation Roundtable,

¹ Ten years after Karpin this issue was looked at again by Jon Nicholson & Amanda Nairn in *The Manager of the 21st Century - 2020 VISION*, Boston Consulting Group, 2006

² Innovation Research Network - Submission no. 332; Business Council of Australia - Submission no. 390 supplementary, Australian Industry Group - Submission no. 265,

³ The Hon Steve Bracks, *Review of Australia's Automotive Industry*, Canberra, 2008, p83. See also p47

⁴ Dodgson M., Gann D. and Salter A., *The Management of Technological Innovation: Strategy and Practice*, Oxford University Press, Oxford, 2008.

⁵ The Productivity Agenda, in *Australia 2020 Summit Final Report* pp. 5-32. (2008)

participants commented that learning accounts would give people a measure of direct control over, and a stake in, their employment options and choices.

The Panel strongly supported the importance of continuing skills development and noted that DEEWR is exploring the life long learning account and other life long learning initiatives. We believe that with thoughtful design it should be possible to design an effective scheme for life long learning, and that the prospective benefits merit substantive work on such proposals. This work should be shaped by the high level policy objective of enhancing and upgrading individual skills and career development opportunities in the interests of the overall productivity and innovativeness of workplaces and the economy.

Promoting strategies to support workplaces

The workplace, however configured, is where management and employees come together to make things happen. This is where innovation comes to the fore, or fails, particularly with process and business model innovation.

Many government workplace and innovation programs in Australia are directed at technological or scientific innovation while only a few are directed at strengthening innovation management inside organizations, including leadership and culture. Recently the Review of Australia's Automotive Industry called for a sustained leadership dialogue:

Given the competitive pressures the industry is experiencing, a greater emphasis on improving productivity, reforming work and management practices, and promoting a productive workplace culture will be required if the Australian industry is to remain competitive in the longer term. While volume, economies of scale and innovation [broadly defined] remain the key determinants of productivity in the industry, more needs to be done to encourage high-performance workplaces and cost-competitive supply chains.¹

This is an area which has received extensive attention in recent years in countries like the UK², Ireland³, Finland⁴ and New Zealand.⁵ The challenge is how best to promote successful adoption and diffusion of high performance work systems in both the public and private sectors.

1 Bracks Review, op. cit., p84

2 <http://www.theworkfoundation.com>

3 See <http://www.workplacestrategy.ie>

4 "TYKES supports research-assisted work organization development based on cooperation between management and staff, which promotes qualitatively sustainable productivity growth in Finnish workplaces. The programme focuses on practical applications, but also promotes research linked with organizational development". http://www.mol.fi/mol/en/01_ministry/05_tykes/index.jsp

5 Parry K.W. and Proctor-Thomson, S. B., Leadership, culture and performance: The case of the New Zealand public sector. *Journal of Change Management*, Vol. 3(4), pp. 376-399. 2003

One strategy discussed was the establishment of a national taskforce, or forum, on the workplace of the future [see Box 1]. Models for the successful implementation of such a project have been developed in other countries.¹ Essentially, a national forum would provide a process for engaging all the constituencies in a discussion about how enterprises and workplaces become the ‘delivery mechanism’ for innovative practices and new levels of performance. The process should be both national and cross-departmental, to enable ‘joined up thinking’ across multiple constituencies.

Box 1: National Forum on the Workplace of the Future

The aim of a national forum on the workplace of the future would be to involve all relevant parties in the development of a shared vision for the future of Australia’s workplaces, based on evidence and data gathering. A further aim would be to enable broad agreement on a trajectory or ‘roadmap’ for change at the workplace level, in both the public and private sectors, and on the actions and policy measures required to bring it about.

A national forum on the workplace of the future would strengthen innovation capabilities, leadership skills and management practices at the level of the workplace.

Key tasks the forum could be charged with include:

- building learning networks;
- running collaborative industry research projects;
- analysing, researching and disseminating information about industry practices and needs;
- communicating practices that lift innovation activity in areas such as leadership and management; and
- providing input to, or coordinating, a national human capital survey.

Some ways to meet skills challenges

Skilled migration

As noted in the United Kingdom’s Innovation Nation, skilled migrants play important roles in the innovation system by reducing the costs of training and entry into international knowledge networks and helping to buffer impacts of fluctuating supply and demand of specific skills. Skilled immigrants are significant in Australia’s innovation system.

For example the Productivity Commission report noted that Australia has experienced a net gain in nearly all science occupations and

¹ See, for example, Green, R. and Walshe, E., ‘Organisational model’ for the national forum on the workplace of the future, Centre for Innovation & Structural Change, National University of Ireland, May 2003. Kim Windsor also provided the Review (communication 13 February 2008) and the May roundtable with useful insights into the mechanics of ‘Innovation Learning Laboratories’ at a regional cluster level, and how to leverage local projects into wider learning.

larger net gains in computing professionals and engineers in every year between 1996-97 and 2004-05.¹

Australia has immigration programs for labour market supplementation such as the General Skilled Migration scheme, as well as schemes designed specifically for employers to recruit highly skilled workers.² However some submissions commented that current policies do not adequately facilitate access to the global talent pool.³

Recommendation 5.2: Innovation policy should be aligned with immigration policies to ensure that they facilitate Australia's access to the global talent pool. In particular, human capital should carry equal or more weight than economic capital in individual migration assessments.

T-shaped credentialing

Those studying innovation in services have highlighted the importance of 'T-shaped' professionals — that is professionals with a grounding in their own discipline but with sufficient knowledge and flexibility to embrace the insights of other disciplines.

Governments can make a major contribution here — by improving the efficiency with which we can qualify the next generation of T-shaped professionals. And the best contribution governments can make to that cause is to help facilitate the introduction of 'T-shaped' professional pathways.

Thus educational and credentialing pathways should be built to maximise the flexibility with which enriching transitions can be made. With necessity being the mother of invention, programs like the New York City Teaching Fellowship program were developed to respond to a drastic teacher shortage with accelerated transitional teacher training for the city's professionals. Similar schemes involving accelerated transitions to teaching have been developed elsewhere in the US and England. Victoria's Minister for Education also spoke recently of Victoria's interest in a similar scheme.⁴

But the idea of facilitating enriching professional transitions can be taken much further. For instance a science graduate might undertake say an eighteen or twenty four month graduate qualification in intellectual property law and undertake appropriate

1 Productivity Commission, Public Support for Science and Innovation, March 2007.

2 For example the Employer Nomination Scheme and the Regional Sponsored Migration Scheme.

3 For example Innovative Research Universities Australia – Submission no. 95.

4 "Brightest and best to help difficult schools", The Age, 24 Aug, 2008. <http://www.theage.com.au/national/brightest-and-best-to-help-difficult-schools-20080824-41ew.html>

professional practice or ‘articles’ in an intellectual property law practice in order to qualify to practice as an intellectual property lawyer. A social worker might transition into family law or landlord and tenant law in a similar way.

Despite its shorter time-span, such a course could provide substantially better exposure than existing pathways to the issues dominating professional practice in the area chosen.

Of course if such specialist practitioners wished to practice in other areas in the future, further qualification and professional experience may be appropriate.

There are currently many obstacles to building such pathways. Even with the best will in the world, a professional body will consist of people who have qualified according to the ‘old’ way of doing things and who are accordingly conservative about alternatives. And professions have a conflict of interest in their role as gatekeepers. Representing those who have ‘paid their dues’ to enter the profession they are now ‘insiders’ with some interest in limiting new entrants to the profession.

For this reason, and particularly where, as is usual, they are participants in co-regulation with the professions, governments have an important role in ensuring that pathways remain flexible so that the most appropriate mixes of skills can be acquired in the most efficient way possible. They should use their influence on such co-regulatory bodies to bring this about.

Because state governments are typically involved in such co-regulation with appropriate policy development, this is an appropriate subject for progress within the COAG reform agenda.

Recommendation 5.3: Establish a program to encourage and support professional bodies (working with educational institutions and State and Territory Governments as appropriate) to provide accelerated pathways to facilitate enriching professional transitions so as to make Australia a world leader in this area.

- *The Advocate for Government Innovation (see Chapters 10 and 12) should develop priorities with the aim of developing some breakthroughs within eighteen months;*
- *An early priority should be further building pathways for key professions in which there are skill shortages. One such initiative would facilitate the entry of science and mathematics graduates into teaching; and*
- *The Minister for Education, Employment and Workplace Relations should make a statement on progress on this agenda within eighteen months.*

In summary, high quality human capital is critical to innovation. Equipping our people with the skills to innovate is essential, not only for the generation and application of new knowledge, but also to use and adapt the knowledge produced elsewhere

Building high quality human capital requires attention at all levels of education: from early childhood education and schooling, through vocational education and training and higher education, and into the workplace

The Panel acknowledges the substantial range of human capital reform processes being progressed at the national level, and in this context, lends support to these reforms. We also recognise the importance of these reforms to the innovation reform agenda.

Human capital reforms and related issues often span portfolios, jurisdictions, sectors and disciplines. Often this is not straightforward, instead requiring carefully considered approaches and complex solutions. We believe that collaboration between all involved parties will be essential if we are to adequately address our human capital challenges in the broadest sense.