SECURING AUSTRALIA'S FUTURE

Skills and capabilities for Australian enterprise innovation

PROJECT 10

EXTRACT

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SECURING AUSTRALIA'S FUTURE

Funded by the Australian Research Council and conducted by the four Learned Academies through the Australian Council of Learned Academies for the Australian Chief Scientist and the Commonwealth Science Council. Securing Australia's Future delivers evidence-based research and interdisciplinary findings to support policy development in areas of importance to Australia's future.

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Skills and capabilities for Australian enterprise innovation

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Australian Academy of the Humanities

Australian Academy of Science

Academy of the Social Sciences in Australia

Australian Academy of Technology and Engineering

ACOLA

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ACOLA receives Australian Government funding from the Australian Research Council and the Department of Education and Training.

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Project aims

It is widely accepted that Australia needs an innovative, flexible and creative workforce with the capabilities to enable the country to maximise its opportunities. While technical and scientific capabilities are recognised as critical, there is a growing awareness that innovation also requires people who understand business, systems, culture and the way society uses and adopts new ideas. Business innovation and productivity therefore requires the interaction of a broad range of technical and non-technical capabilities. International studies have found that while building capabilities is a high strategic priority for companies and the required capabilities have evolved, the methods for building those capabilities have not. This project seeks to examine the way that Australia's high-performing enterprises identify, manage, build and mix the capabilities to succeed.

Approved aims of the project:

1. Examine how high-performing Australian enterprises identify, manage and build key capabilities.
2. Identify how technical and non-technical (usually considered to be respectively STEM and HASS-based) capabilities interact in high-performing Australian enterprises in the context of innovation challenges.
3. Outline the human resource strategies, leadership and organisational structures in such enterprises.
4. Consider the effects of innovation on both SME and large firm performance.
5. Identify best practice and findings (from both Australia and overseas) that will assist the development of policies and programs by government, industry and education institutions.

Executive summary

Aim

Australia needs an innovative, agile and creative workforce with the skills and capabilities to secure its future productivity. This report aims to fill a significant gap in Australia's understanding of innovation, in particular how diverse skills and capabilities—especially technical and non-technical skills—work together in enterprises to foster innovation.

Specifically, this report:

1. investigates the extent to which technical and non-technical skills underpin the different forms of innovation (technological, operational or process, product and marketing)
2. examines how innovative Australian enterprises identify, manage and build technical and non-technical skills and capabilities, and how the interaction of these skills and capabilities meets innovation challenges
3. explores the potential for industry, education and government responses to promote optimal investment in human skills and capabilities that support enterprise innovation.

Research conducted

This project has analysed skills mixing through a range of data-gathering and research activities: desk research; comprehensive literature reviews; Expert Working Group meetings; 19 interviews with senior executives in highly innovative Australian organisations; commissioned research, which included a statistical investigation of data from the Expanded Analytical Business Longitudinal Database, augmented by analyses of Australian Bureau of Statistics' Business Characteristics Survey data; and a study on the roles of government, industry, and education and research institutions for developing innovation capabilities, incorporating interviews with over 30 experts on innovation practice and policy.

Summary of research results

Innovation requires a diverse mix of skills and capabilities

The basis for innovation—including new products, services, processes or business models—in a knowledge-based economy is diverse and pervasive. Innovation is not just based on research, science or technology, or even on entrepreneurial skills. Managerial and marketing skills, organisational, social, economic and administrative knowledge, and intellectual and creative capacity are also required to successfully translate new opportunities, ideas and discoveries into innovation.

The current focus on science and technology skills inputs is not sufficient to address Australia's shortcomings in innovation. A distinguishing feature of Australia's leading innovative enterprises, both for-profit and not-for-profit, is that they access and thoroughly mix technical and non-technical skills and capabilities as a basis for success.

Statistical analyses of large-scale Australian data corroborate that a broad range of different skills are associated with different types of innovation. The future of high value, high paid work depends on Australia learning the lessons from leading innovative enterprises, such as those discussed in this report.

The findings and implications of this report have the potential to broaden yet complement the current policy focus on science and technology, enabling a more holistic approach to tackling Australia's innovation challenges that teams humanities, arts and social sciences (HASS)-based skills with science, technology, engineering and mathematics (STEM)-based skills.

Australia can become a more efficient innovator

The 2015 Global Innovation Index reveals that Australia is a relatively inefficient innovator. The Index ranks input measures (institutions, human capital and research, infrastructure, market sophistication, business sophistication) and output measures (knowledge and technology, creative) of 141 countries. Australia's overall ranking for innovation inputs is reasonable (10th). However, the overall ranking for innovation outputs is significantly lower (24th). This disparity means Australia has a low innovation efficiency ratio score.

The Index indicates that Australia generally has the relevant skills but lacks the capacity to manage and use these skills and other inputs for innovation. In particular, the Index indicates shortcomings in the capacity of Australian businesses and the overall innovation system to bring innovations to application and to disseminate them in markets and society. Australia has low scores in business sophistication inputs (24th), with particular shortcomings in innovation linkages (38th) and knowledge absorption (63rd), and low scores in knowledge and technology outputs (39th), especially knowledge impact (32nd) and diffusion (99th). See Chapter 2 for details.

Australia's innovative enterprises thoroughly mix technical and non-technical skills for innovation

Successful innovation into the future depends on the core components of the Australian innovation system—Australian enterprises, education practice, and government policy—moving beyond a dominant focus on technical skills to also consider the other sets of skills that are necessary. Technical skills are necessary, and in many cases foundational, but are not sufficient for successful, sustained innovation.

This report takes the approach of 'bundles' of skills for innovation by framing:

- individuals as bundles of skills and competencies
- teams and organisations as bundles of people with complementary skills
- networks as bundles of organisations (networks, supply and value chains).

This is in line with international evidence that investing in human capital is a critical element in driving higher levels of innovation. However, it is not simply a matter of increasing the supply and diversity of skills at the individual level. Rather, it is how skills are brought together within organisations, industries and innovation 'ecosystems'. It is also how these skills are combined with physical capital and effective organisational systems to yield fresh ideas that generate new products or services, new applications of technologies in production, and new ways of marketing and distributing those goods and services. This approach aligns with the shifts in thinking about innovation over recent decades, from 'first generation' linear approaches, to 'second-generation' systems approaches, to 'third generation' ecological approaches. See Chapter 3 for details.

Organisations need the competencies to source and retain this skills mix and position themselves as valuable partners in the innovation ecosystem. This report shows how leading innovative Australian enterprises identify, manage, build and mix the skills and capabilities needed to meet innovation challenges and succeed in increasingly competitive, digitally-disrupted, globalised markets.

While there is a widespread perception that STEM-related skill shortages are inhibiting innovation, this is generally not the case among Australia's leading innovative enterprises. Instead, innovative organisations exhibit distinctive ways of addressing the challenges by efficient skills mixing for innovation, at the individual, organisational and systems/sectoral level.

Innovation requires skills mixing in individuals

Highly innovative organisations interviewed for this report focus strongly on acquiring and developing the broad skills they need to be innovative. Most attribute their recruitment success to using non-traditional human resources (HR) approaches and providing a desirable work environment.

They spend substantial time and resources finding and developing the right employees. They recognise that attitudes, cultural fit with the organisation, and 'cleverness' or 'emotional intelligence' are as important, if not more important, than technical skills requirements. As well as relevant technical (professional) skills, candidates also need to possess non-technical skills, such as analytic and critical thinking, problem solving, social or cultural knowledge, creativity, leadership, communication and people skills. This often makes technical skills and disciplinary fields a secondary consideration.

These organisations invest in developing technical and other skills internally, while also accessing skills and information related to innovation through their external networks. While larger companies can invest more in specialised staff and achieve a skills mix through specifically assembled teams, start-ups need leaders with broad skills and can add additional skills variety through contractors.

In addition, innovative organisations support other opportunities for sharing knowledge internally or externally. Highly innovative organisations embrace opportunities to include and exchange knowledge with students at any time of their education, such as through cadetships, internships and joint PhD projects. Such Work Integrated Learning (WIL) can provide exposure to potential future employees, expose the organisation to new ideas, and provide an inexpensive way to approach ideas and projects that would otherwise be neglected. However, WIL requires strong resource commitment, and is very uneven across the undergraduate university experience.

For decades, major reports have identified shortcomings in leadership and management capability in Australian enterprises. Highly innovative organisations consciously develop expertise in leadership and management capability by investing in recruitment, graduate programs and job rotation, internal development, and offering appropriately designed jobs and work-life balance initiatives. Such leadership and management skills are less evident in small and medium enterprises (SMEs), including entrepreneurial start-ups.

Formal education no longer provides a sufficient skills basis for the rest of a person's working life. Individuals and organisations need continual skills development, while universities and other teaching institutions need to teach more broadly across disciplines, covering transferable skills alongside specialist knowledge. Highly innovative organisations provide considerable training and encourage self-directed learning and other forms of continuous development. Especially in areas where skills are outdated very quickly, organisations focus on learning abilities and more fundamental skills.

Highly innovative organisations also pay attention to how work is organised (often focusing on flexibility and autonomy), incentive structures and clear career pathways. The 'right' work environment frequently includes

non-traditional review and career progression arrangements, social spaces and amenities, flexible work conditions, work-life balance initiatives and health checks. As employers, these organisations view themselves ideally as social communities that empower members to unfold their innovative capabilities. See Chapters 4 and 5 for details.

Innovation requires skills mixing across teams and across organisations

To maintain their external focus, cross-functionality and adaptiveness, leading organisations form teams by hiring staff from outside their own sector.

Innovative organisations do not rely on new people simply being 'work ready'. Leaders in these companies are especially aware of the need to future-proof against the increasing commoditisation of technical skills. Job development and rotation are important to develop a whole-of-organisation mindset.

Diversity in its various forms—including skills diversity—is critical in all innovative organisations. The need for skills diversity is based on the realisation that much innovation happens at the intersection of different disciplines and ways of thinking about problems. Highly innovative organisations have strong track records of 'holism' in their HR approaches.

However, the evidence suggests that, on average, organisations are underinvesting in the types, level and mix of skills required to be innovative. Lean management principles focusing only on core competencies can lead to a narrowing of skills sets, hollowed out middle management and undervalued HR departments operating under pressure. In contrast, innovative organisations recognise the value and importance of HR and skills considerations, irrespective of the size of the enterprise or formality of the HR function.

Accessing skills both internally and externally is an essential element of third generation innovation thinking. The viewpoints and ideas from other organisations, often outside the sector, are greatly valued in advancing innovation. Innovative organisations use partners, contractors, networks and clusters to access external expertise to complement their internal skills. This is particularly the case for smaller organisations or start-ups with limited resources to attract and retain internal skills diversity.

These innovation skills requirements set expectations for the design of undergraduate and postgraduate curricula, for where companies need to invest in training and development, and for government considerations in designing frameworks for national strategies around skills development.

Meeting innovation challenges over time

Innovative companies interviewed for this project support the findings of previous research that shows leaders who are 'T-shaped'—those with deep knowledge in one field and broad understanding across many other fields—tend to run more innovative organisations. Leadership for innovation often requires stepping outside the company's traditional core competencies to develop diversity of skills at all levels of the organisation.

As noted, innovative organisations highly value employee skills beyond technical specialisations. In particular, they often regard an understanding of global markets, competition and customers as essential to understand the organisation's full value proposition. Almost all the innovative organisations interviewed are connected to global supply chains and clusters that enable growth to support innovation.

An invaluable attribute for successful innovators is to understand innovation from the perspective of customers and users of products and services. Innovative organisations are developing skills that help them make sense of customer information and deduce what customers will want next.

Innovation and related activities are characterised by a high degree of uncertainty. Investments that contribute to innovation often do not

pay off immediately, but require a long-term approach. In contrast, shareholder and business expectations may emphasise short-term profits over long-term sustainability and reinvestment. To sustain innovation, organisations need to balance these competing demands. Highly innovative organisations shield their business from a profit-driven, short-term focus, instead focusing on longer-term sustainable generation of value. This relates to both capital and skills investment for innovation.

Where necessary, innovative enterprises invest heavily in research and development (R&D) including through collaboration and partnerships with universities. They ensure R&D activities are well-connected with their business and financial experts to avoid developing innovations with limited potential for generating value. Innovative companies practice bringing together technical engineering and complex stakeholder-centric thinking, and actively prepare for future workforce requirements.

The Industry Growth Centres initiative can improve Australia's innovation performance, and the re-elevation of CSIRO's role in innovation transfer between research and industry, as described in the National Innovation and Science Agenda, is a first necessary step towards optimising partnerships across the innovation system.

Government policy can support dynamism and flow within the innovation system by facilitating collaboration and cooperation. A major role for government is providing conditions that support the mix and use of skills beyond organisational and sectoral boundaries. The National Innovation and Science Agenda intends to stimulate collaboration between researchers/academics and business. However, it does not address the need for improved collaboration between enterprise and the tertiary education sector in general, or measures to increase business-to-business collaboration for innovation. Innovation policy should also provide a balanced narrative about the major inputs to innovation, including the contribution of HASS disciplines alongside STEM disciplines.

Findings and implications

Overarching findings and implications for enterprise, education and government

Finding 1

Innovation policy-makers, industry leaders and innovative organisations increasingly recognise the complex ecosystem required to support enterprise-level investment in skills and innovation.

Government, industry, and education and research institutions can tackle Australia's innovation challenges by adopting holistic system-level approaches to innovation policy settings.

This involves integrating and aligning policy responses designed to influence investments in skills and capabilities for innovation, at the individual, enterprise and system level. There is a crucial role for the newly established authority Innovation and Science Australia to refine and target Australia's performance in skills mixing for innovation.

Finding 2

By international standards Australia has an average track-record of innovation, reflecting issues across all levels of the innovation ecosystem. In particular, Australia could more effectively turn innovation inputs, such as investments in human capital and research, into knowledge and technology innovation outputs.

Government, industry, and education and research institutions can more efficiently turn innovation inputs into outputs.

While the Industry Growth Centre initiative has prompted some changes to research and commercialisation in specific industries, further incentives could increase collaboration for innovation, dissemination of outcomes, and the general external focus of organisations. A National Innovation and Science Agenda initiative, Australia's Global Innovation Strategy, aims to promote links with leading international bodies. Future innovation policy could place a heightened focus on collaboration in general, with higher-order skills integration for innovation built into this collaboration model.

Finding 3
Highly innovative organisations are embedded within strong innovation ecosystems that enable access to skills bundles. As well as internal skills development, they use external labour markets, and collaborative relationships with other organisations and networks.

Government, industry, and education and research institutions can support innovation by encouraging the formation and integration of networks and clusters.

This includes government investment in regional infrastructure (e.g. business parks) and co-location with universities and research institutions. While tax incentives to locate in specific regions can accelerate cluster formation, it is also important that this proximity of complementary enterprises provides sufficient long-term benefits. The Industry Growth Centres are a ready mechanism to support such developments. This model could be extended beyond the current five centres, after a review of their effectiveness.

Finding 4
Highly innovative organisations develop employees with broad knowledge bases and strong integrative skills (beyond a single discipline). The bundles of required skills vary across the innovation cycle and include technical skills (science, technology, engineering, mathematical, digital) and non-technical business skills (business, management, financial, marketing) as well as creative, design, interpersonal and entrepreneurial skills. Highly innovative organisations use sophisticated recruitment and retention practices, internal training and development, incentive systems, strong cultures and engagement. They typically take a long-term approach to investing in and building skills bundles that support their innovation strategy.

Government, industry, and education and research institutions can assist individuals, organisations and the innovation system to build a broad base of skills and update these skills over the lifetimes of individuals and organisations.

This strategy may include broader learning opportunities within more well-defined educational pathways for individuals, as well as assisting organisations to provide training (on and off the job) to encourage the development of broad skills bases among their employees.

There are also opportunities for government, industry and education and research institutions to foster and promote longer-term approaches to innovation success.

The National Innovation and Science Agenda recognises the need for tolerating failure in entrepreneurial activities. This attitude is also necessary to support innovation in general.

Organisations can take more responsibility for developing the skills required for innovation. However, policy changes may also be required to sustain these efforts, such as grants for R&D (which can be based on specific requirements, e.g. collaborative innovation).

Findings and implications related to individual skills mixing

Finding 5
Innovative organisations require individuals with a range of skill sets beyond technical skills and who are willing to adopt a life-long learning approach to acquiring new skills.

Joint action from government, industry, and education and research institutions can enable individuals to acquire and continue to develop a more holistic and integrated profile of diverse skills.

These skills profiles will typically involve integration of:

- expert skills, based on disciplinary background
- work or 'employability' skills, such as communication, teamwork, planning and organisational skills
- problem solving and higher-order integration skills
- skills that enable theoretical knowledge to be translated or applied to practice.

In particular, education institutions can extend the:

- creation of articulation pathways between vocational education and training (VET) and university-level programs
- introduction of WIL as part of undergraduate and graduate programs across disciplines, including internships and practicums, and applied or translational PhD programs
- integration of innovation skills into technical disciplines delivered at the VET, undergraduate and graduate program levels, such as design thinking and digital literacy, collaboration and teamwork, and problem solving.

Many of these initiatives place some responsibility on enterprises to participate more actively in skills development through:

- identifying opportunities for WIL, internships and graduate programs that enable 'hands on' development of work-related skills in industry organisations
- contributing to curriculum development where programs seek to develop employability or other work-related skills
- signalling the importance of broad-based innovation skills in recruitment and selection, career development and incentive structures.

The diffusion of such initiatives may require policy initiatives by government to encourage or direct industry and education/research institutions to change their practices, including reforms related to:

- extending existing institutional arrangements designed to support dialogue and collaboration between government, industry and education/research institutions
- providing tax and other incentives for organisations to invest in skills and to participate in WIL
- formulating new skills frameworks that recognise holistic and integrated skills needs within traditional trades and disciplines
- creating new pathways and incentives that encourage individuals to develop more diverse bundles of skills (for example, combining a VET certificate with an undergraduate program)
- employment regulation supporting the use of internships as part of formal training programs promoting skills for innovation in school curricula, to integrate an emphasis on entrepreneurship and coding, for example, into more holistic skill sets. The National Innovation and Science Agenda initiative 'Talent and Skills – Best and Brightest' could be broadened to embrace integrative skills for innovation
- SMEs may require assistance to facilitate graduate training programs, for example, through pooling across organisations, as done in some apprenticeship degrees.

Finding 6
Highly innovative organisations overcome significant barriers to innovation through strengthening management and leadership capabilities.

Government, industry, and education and research institutions can enable individuals to acquire and continue to develop high-level management and leadership skills.

Managing innovation requires skills in collecting and assessing ideas, presenting and promoting ideas and concepts, leading product/service development and testing and marketing new products and services.

Management and leadership skills can be developed through a number of mechanisms, many of which are currently in use, but not necessarily widely accessed or available. Online education platforms provide a low cost means to deliver such programs at scale to widely dispersed groups of organisations and individuals.

A wide variety of benchmarks and diagnostic tools are available for assessing leadership capabilities, such as the Leadershift platform funded by the Australian Department of Employment.

Industry has a critical responsibility to foster management and leadership capabilities. As well as directly investing in management training, organisations can:

- introduce mentorship programs with experienced managers to internally disseminate leadership knowledge and encourage and provide time for self-directed study and development
- use secondments across partner/collaborating organisations, for example suppliers or clients can provide new opportunities for new managers to build their domain-specific and management expertise.

Education institutions also need to take action in educating the future workforce. There is a need to emphasise broad relational and problem solving skills applicable across all disciplines. For tertiary education, this may require new curriculum developments that build skills mixing, by:

- integrating management subjects in non-business degrees, and embedding technical programs in business and arts degrees
- providing internship opportunities and practicum subjects within academic programs
- creating opportunities to complete more practical certificate-level programs while completing a degree program
- organising student projects that span across faculties.

Finding 7
Higher education students can develop a more holistic understanding of the skills required for innovation through greater exposure to enterprise workplaces.

More university programs can expose students to a holistic WIL experience, which includes longer-term projects with a range of industry organisations.

Universities and industry can work together to develop more extensive and better resourced WIL policies and practices. Such policies need to focus on exposing students to higher-order integration skills and champion those skills as a fundamental feature of successful enterprises.

Findings and implications related to team and organisational level skills mixing

Finding 8
Innovative organisations need diverse bundles of people, as well as people with diverse bundles of skills.

Australia's 'economy in transition' can strive to build a capacity more aligned to '21st century' skills, which include higher-order integration, or holism, as a common attribute.

This will help address Australia's underperformance in research translation and collaboration between enterprises. For example:

- education institutions, especially tertiary education, can offer courses that span multiple faculties
- enterprises can cultivate organisational cultures and practices that more purposefully assemble teams with diverse skills
- government can facilitate skills diversity by promoting best practice and assisting businesses, especially SMEs, with advice and education on how to organise teams for innovation—the U.S. Small Business Administration provides an international model, and a comparable role could be built into Australia's Industry Growth Centres
- state and territory governments can extend their R&D voucher systems to cover holistic skills development and training
- Innovation Science Australia can build these insights into its program of policy development around skills for innovation.

Finding 9
Innovative organisations have well-developed HR systems to enable access to diverse skills and also organise their work to support innovation.

The Australian Institute of Company Director's diploma and other such courses can support innovation by including HR, skills diversity and skills mixing.

More managers can embrace the importance that leading companies place on 'instilling a talent mindset', and on how HR practices can be used to successfully recruit skills for innovation. This often includes a focus on attitudes rather than skills alone, and encouraging involvement in activities beyond formal education. Expertise in recruiting and retaining talent are critical factors for innovation; innovative organisations enable individual, team and 'life' skills.

Findings and implications related to systems level skills mixing

Finding 10
More third generation innovation thinking and practices will support a stronger innovation culture in Australia.

Government plays a crucial role in facilitating collaboration and cooperation for innovation.

Governments and policy makers could, for example, balance calls for teaching coding in every Australian school with the evidence from this report. Exposure to the practical ways in which organisations mix technical and non-technical skills to meet innovation challenges is critical to prepare current students for the future of work.

Government and policy makers can also collect better information on skills needs, use and expectations in the future, for instance through expanding and optimising the Expanded Analytical Business Longitudinal Database (EABLD) survey administered through the Australian Bureau of Statistics to take into account the complex dynamics and interactions inherent in third generation innovation.

Such practices would enable better advice to students, schools and higher education institutions. Government collaboration with forecasting teams, such as those engaged with the CEDA report may be another option. There could also be better data collection and use along with greater collaboration between universities and business chambers.

Finding 11
Deeper collaboration across enterprise boundaries, including integrating Australian organisations into global value chains, will significantly improve Australia's innovation performance.

Future innovation policy could focus more on developing the skills for innovation within a broader skills development context. In addition Innovation and Science Australia could extend its role to cover holistic skills for innovation and consider:

- developing and supporting sector-specific management education and training, and related skills development, for entrepreneurs and managers in high-growth businesses
- funding 'higher apprenticeships' in Industry Growth Sectors, as agreed with Growth Centre Chairs
- encouraging co-investment in tertiary education–industry skills development programs
- showcasing careers of 'VET-trained business entrepreneurs' who become employers
- highlighting why and how employers can (or don't) take on 'learners' as graduates, interns or apprentices.

Government's major policy instrument to incentivise enterprise innovation, the R&D Tax Incentive, could be refined to more directly address the findings in this report. For example, a proportion of the incentive devoted to 'profit contingent' loans could be coupled with pre-requisites for skills development measures or for collaborative arrangements. There are two possible reasons for rethinking the basis of government subsidies in the R&D area, to move away from total reliance on grants and towards loans of this type: (i) the difficulties associated with establishing causal links between subsidies and value-added innovation behaviour implies concern with monitoring and establishing the connection between subsidies and R&D outcomes; and (ii) loans systems, particularly

generously designed loan systems, have the great potential for achieving similar outcomes as grants at far less cost to taxpayers. Details on what a respective scheme could look like are in Chapter 5.

Tax incentives, for example for employing PhDs in industry, could also be deployed to address the low levels of collaboration and knowledge transfer between Australian industry and education/ research institutions which inhibit the development and diffusion of new innovations. Enterprises could be eligible to claim a tax incentive for the employment of PhD graduates. Administrative arrangements should be developed to ensure continuity of employment and protection of employee rights.

Finding 12
Investment in innovation ecosystems in specific industries and regions will significantly improve Australia's innovation performance.

Enterprises can do more to engage with local clusters and integrate themselves into networks of innovation on a national and international level. This could include investments in collaborative projects, such as joint spin-off companies.

Education institutions can also increase initiatives to become active in clusters, precincts and enterprise networks.

Also organisations need to engage more with local clusters and integrate themselves into networks of innovation on a national and international level. This could include investments in collaborative projects, such as joint spin-out companies.

Government and policy makers, however, provide the conditions that make it attractive for both organisations and education to co-locate in clusters. Overseas, initiatives that appear to have worked include sponsoring infrastructure, such as business parks, and providing incentives for businesses to locate there through tax breaks. Government's main role is to facilitate and connect organisations. For instance, government can provide services through sub-contractors to find innovation partners. Governments can also be significant players in regional/sectoral ecosystems through their procurement practices.

The National Innovation and Science Agenda acknowledges that the Australian Government has a significant spend on procurement, but ranks only 70th out of 141 countries on how well its procurement fosters innovation. Drawing on lessons from the US Small Business Innovation Research and the UK's Small Business Research Initiative, government can apply insights developed in this report to better embed skills for innovation through procurement.

About Securing Australia's Future

In June 2012 the Australian Government announced *Securing Australia's Future*, a $10 million investment funded by the Australian Research Council in a series of strategic research projects. Projects are delivered to the Commonwealth Science Council by the Australian Council of Learned Academies (ACOLA) via the Office of the Chief Scientist and the Australian Chief Scientist.

Securing Australia's Future is a response to global and national changes and the opportunities and challenges of an economy in transition. Productivity and economic growth will result from: an increased understanding in how to best stimulate and support creativity, innovation and adaptability; an education system that values the pursuit of knowledge across all domains, including science, technology, engineering and mathematics, the humanities and social sciences; and an increased willingness to support change through effective risk management.

Six initial research topics were identified:

i. Australia's comparative advantage
ii. STEM: Country comparisons
iii. Smart engagement with Asia: leveraging language, research and culture
iv. The role of science, research and technology in lifting Australian productivity
v. New technologies and their role in our security, cultural, democratic, social and economic systems
vi. Engineering energy: unconventional gas production

Five further research topics have been identified:

vii. Australia's agricultural future
viii. Delivering sustainable urban mobility
ix. Translating research for economic and social benefit: country comparisons
x. Skills and capabilities for Australian enterprise innovation
xi. Business diasporas in Australia: maximising people to people relationships with Asia

The Program Steering Committee responsible for the overall quality of the program, including selection of the Expert Working Groups and the peer review process, is comprised of three Fellows from each of the four Learned Academies:

Professor Michael Barber FAA FTSE (Chair)

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