Committee Secretary
House of Representatives Standing Committee on Education and Employment
PO Box 6021
Parliament House
Canberra ACT 2600
ee.reps@aph.gov.au

Dear Committee,

Re: Inquiry into innovation and creativity: workforce for the new economy

The Australian Technology Network (ATN) welcomes the opportunity to present evidence to the Education and Employment Committee on matters that would ensure Australia's education system can meet the needs of a future labour force focused on innovation and creativity.

The following submission will focus on higher education graduates specifically, but notes the role that primary and secondary education, and VET have, in producing a pipeline of high quality graduates able to meet the skills required for the jobs of today and the future.

In making this submission, the ATN also acknowledges that members may present their own complimentary evidence to the committee.

As a group of innovative and agile universities, the ATN are invested in making sure that our graduates are trained with diverse skillsets and an appetite for acquiring and applying knowledge throughout their lifetimes to meet current and future workforce needs.

Each of the ATN universities' strategic plans reference an ambition to produce graduates who are variously 'work-ready', 'future-focussed', 'curious, agile and resilient learners', 'career-ready' and equipped with 'transferrable skills for employment and life'.[1]

From this, it is clear that ATN universities are leading nationally with regard to their role in contributing to the workforce for the new economy, however the challenge remains as to how universities respond to evolving student and employer demands and expectations, and the extent to which the ongoing macro trends (e.g. digital innovation, automation, the Asian Century) disrupt the delivery of higher education.

---

[1] Taken from the following strategic plans QUT: Real World Learning 2020 Vision; RMIT: Ready for life and work: RMIT's strategic plan to 2020; UTS http://www.uts.edu.au/sites/default/files/strategic-plan-2014.pdf; http://www.uts.edu.au/sites/default/files/UTSInnovationAndCreativeIntelligenceStrategy2015-2018.pdf UniSA: http://www.unisa.edu.au/about-unisa/strategic-action-plan-2013-2018/;Curtin: http://strategicplan.curtin.edu.au/teaching-and-learning/

Recommendations:

1. **Support the scaling up of Work Integrated Learning opportunities at universities, building on the work laid out in the *National Strategy on Work Integrated Learning in University Education*.**
2. **Explore and articulate the complementary role of non-STEM and design-led skills in delivering Work Integrated Learning opportunities to meet Australia's current and future workforce needs.**
3. **Mandate accrediting bodies to prioritise curriculum innovation in degree programs, allowing universities to continue to equip graduates with the necessary skills for the jobs of today and of the future.**

1. The extent to which students are graduating with the skills needed for the jobs of today and of the future.

Current Workforce

For a comprehensive overview of the skills required for the future workforce, please refer to the University of Technology Sydney submission to the inquiry. The ATN submission will focus on higher education graduate skills through the lens of Work Integrated Learning (WIL), student perspectives and employer perspectives.

Current employer perspectives provide insight into the skill level of graduates entering the workforce. The Ai Group *Survey of Workforce Development Needs* point to difficulties faced by businesses when recruiting for STEM skills, with 24.9 per cent citing a lack of applicants with STEM skills as the greatest barrier, followed by lack of workplace experience (24.4 per cent) and the content of qualifications not being relevant to business needs (18.3 per cent).

The *Graduate Careers Australia* survey of graduate employers found that the greatest graduate skills shortages were observed in computer science, accounting and electrical/computer engineering. [2] In terms of graduate attributes, employers cited 'communication skills' (48.6 per cent), 'academic results' (24.3 per cent) and 'teamwork skills' (22.4 per cent) as the three most important selection criteria for recruiting graduates. When asked to rate graduate employability skills, the three bottom rated skills were 'initiative and enterprise' (67.8 per cent rated good or very good); 'planning and organising' (62.0 per cent rated good or very good); and 'self-management' (60.4 per cent rated good or very good). Similarly, the *Australian Innovation System Report* highlights a shortage of skills in demand by innovators and exporters such as marketing, business marketing, financial, IT professional and technical skills. [3]

The release of the *Employer Satisfaction Survey* (ESS) via the Government's suite of *Quality Indicators for Learning and Teaching* (QILT) surveys will be a welcome addition to help monitor employer

[2] Graduate Careers Australia (2015) Graduate Outlook 2014: Employers' Perspectives on Graduate Recruitment in Australia, http://www.graduatecareers.com.au/wp-content/uploads/2015/06/Graduate_Outlook_2014.pdf

[3] Department of Industry (2014) Australian Innovation System Report 2014, http://www.industry.gov.au/Office-of-the-Chief-Economist/Publications/Documents/Australian-Innovation-System/Australian-Innovation-System-Report-2014.pdf, p.155

satisfaction with graduates' generic skills, technical skills and work readiness.[4] The pilot of the ESS suggested positive feedback from both graduates and their immediate work supervisors that their university education had equipped them with the required skills to succeed in the workplace, most notably in teamwork and interpersonal skills, foundation skills, and adaptive skills.[5]

Within universities, much of the effort in producing 'work-ready' graduates is concentrated in Work Integrated Learning (WIL) approaches. WIL is the umbrella term for a range of strategies and initiatives to improve the employability of graduates by providing practical experiences related to courses being studied at universities. There are many varying definitions of WIL, but the four crucial elements are: (1) WIL integrates theory with the practice of work (2) WIL involves engagement with industry and community partners (3) WIL involves planned, authentic activities and (4) WIL has purposeful links to curriculum and specifically designed assessment.[6] Typical WIL activities include internships, work placements, undergraduate projects (either on-campus, online, or at workplace) and industry focussed HDR projects.

According to an ACER study on behalf of the Office of the Chief Scientist into *WIL in STEM at Australian Universities*, the current student participation rates in WIL is quite low.[7] Indicative data suggests that barely one in twenty Australian science undergraduates experience WIL placements during the course of their studies. [8] Higher participation rates are observed in ICT disciplines and engineering, where industry placements are part of the professional accreditation requirements of the peak body, Engineers Australia. Three of every four undergraduate ICT bachelor students in Australia experienced an industry based project during their degree, compared with about one in four agriculture and environmental studies students and about one in seven science students. Elsewhere, other studies suggest that approximately 19 per cent of students were involved in a practicum, internship, fieldwork or clinical placement, with employers in large organisations more likely to offer WIL opportunities.[9]

Given the demand for broader workplace skills and knowledge, there is a case for increasing the cohort of university graduates who are engaged in WIL to build a critical mass of work-ready graduates. Targeting the right level and mix of skills (e.g. technical, knowledge-based, employability skills, entrepreneurial, business, management) will be a matter of coordinated effort between universities, industry and government. The ATN advises the Committee to refer the work being conducted via the *National Strategy on Work Integrated Learning in University Education,* developed in collaboration between Universities Australia, the Australian Chamber of Commerce and Industry, Australian

[4] Commonwealth of Australia, Quality Indicators for Learning and Teaching, https://www.qilt.edu.au/about-this-site/employer-satisfaction-survey-%28ess%29
[5] Department of Education (2014) Report on the Pilot Employer Satisfaction Survey 2013-14. Conducted by Workplace Research Centre at the University of Sydney and ORC International on behalf of the Department of Education and Training, https://docs.education.gov.au/node/35889
[6] ACER (2015) Work Integrated Learning in STEM in Australian Universities, Australian Council for Educational Research, http://www.chiefscientist.gov.au/2015/08/report-work-integrated-learning-in-stem-in-australian-universities/
[7] *ibid*
[8] *ibid*
[9] Radloff, A & Coates, H 2010, Doing more for learning: enhancing engagement and outcomes, Australasian Survey of Student Engagement: Australasian student engagement report, Australian Council for Educational Research (ACER), http://research.acer.edu.au/cgi/viewcontent.cgi?article=1011&context=ausse

Industry Group, the Business Council of Australia and the Australian Collaborative Education Network.[10]

Recommendation: Support the scaling up of Work Integrated Learning opportunities at universities, building on the work laid out in the National Strategy on Work Integrated Learning in University Education.

Future Workforce

The ATN Universities have already taken a leadership role in training graduates for the future workforce. As a network of universities the ATN runs Australia's only Industry Doctoral Training Centre that provides PhD candidates with not only deep technical knowledge, but broad skills relevant to a career in industry. These skills include communications, research commercialisation and project management.

Much of the policy focus regarding the suitability of university graduates for the future workforce has been on STEM skills. This focus has been driven by studies pointing to the projected value of STEM in the future workforce demand and economy, highlighting that:

- Occupations requiring STEM skills are projected to grow at twice the pace as non-STEM skills;[11]
- A projected $57.4 billion increase in GDP if 1 per cent of our workforce is shifted into STEM roles; [12] and
- STEM knowledge will be associated with 75 per cent of the fastest growing occupations, innovations and wage premiums.[13]

Given the spotlight on STEM and while accepting its importance to future economic competitiveness, the ATN urges the committee not to overlook the role of non-STEM skills when considering Australia's current and future workforce needs. As noted by Roy Green and John Howard in their issues paper for the *Senate Economics References Committee Inquiry into Australia's Innovation System*, the arts, humanities and the social sciences are also critical to a well-functioning innovation system,[14]

> "The social sciences contribute to innovation through research and practice in the areas such as market research and merchandising (involving social psychology, anthropology, and other disciplines concerning human behaviour), economics (the understanding of the behaviour and dynamics of trade and markets), finance (business case development, demand modelling, options analysis, risk analysis), and management – which is both a discipline and a practice. Management innovations have been critically important in the development of international and multi-divisional businesses." p.6

[10] Universities Australia, Australian Chamber of Commerce and Industry, Australian Industry Group, the Business Council of Australia and the Australian Collaborative Education Network (2015) National Strategy on Work Integrated Learning in University Education, http://cdn1.acen.edu.au/wp-content/uploads/2015/03/National-WIL-Strategy-in-university-education-032015.pdf

[11] Ai Group (2013) Lifting our Science, Technology, Engineering and Maths (STEM) Skills, http://www.aigroup.com.au/portal/binary/com.epicentric.contentmanagement.servlet.ContentDeliveryServlet/LIVE_CONTENT/Publications/Reports/2013/Ai_Group_Skills_Survey_2012-STEM_FINAL_PRINTED.pdf

[12] *ibid*

[13] CSIRO (2016) Tomorrow's Digitally Enabled Workforce, http://www.csiro.au/en/Research/D61/Areas/Data-for-decisions/Strategic-Foresight/Tomorrows-Digitally-Enabled-Workforce

[14] Green, R & Howard, J. H. (2015) Senate Inquiry into Australia's Innovation System: Issues Paper, http://www.aph.gov.au/Parliamentary_Business/Committees/Senate/Economics/Innovation_System/~/media/Committees/economics_ctte/Innovation_System/Interim_Report/c02.pdf

Innovation is not confined to any one sector, with a variety of skills required in the innovation process. Technical skills are important for the maintenance and upkeep of technology; design skills for the creation of new products; marketing for the promotion of products. There is great scope for growth in design-led innovation, especially given the uptake of the digital revolution and need to improve design culture. Green and Howard flag the role of 'design-thinking' in moving away from a commodity culture to a design culture that embraces creation of value for end-users. According to the *Australian Creative Economy Report Card 2013*, the 'creative economy' grew at an annual rate of 2.8 per cent from 2006 to 2011, which was 40 per cent greater than the annual growth rate of the rest of the Australian economy.[15]

In order to adapt, a wide range of skills and expertise will be needed beyond the realm of STEM. A new report by CSIRO entitled, *Tomorrow's Digitally Enabled Workforce* suggests that there are significant challenges and opportunities in the coming twenty years, in the face of digital technology disruption, changing models of working and networking, growing entrepreneurship, an aging population, increased automation and movement into a knowledge economy, with 44 per cent or 5.1 million jobs at risk from digital disruption in the next 20 years.[16]

Furthermore, many new jobs will also be created by technology, and the profile of employing companies will change, with the report noting that:

- Jobs of the future are likely to be more flexible, agile, networked and connected;
- Entrepreneurial skills are likely to be increasingly important for small business founders and employees within large organisations; and
- The number of small businesses employing 1-4 people increased by 35 per cent between 2003 – 2007

From this is it clear that business and enterprise skills such as problem solving and self-management will become even more critical in the future. Examination of how universities are currently addressing these areas will be presented later in the submission.

Recommendation: **Explore and articulate the complementary role of non-STEM and design-led skills in delivering Work Integrated Learning opportunities to meet Australia's current and future workforce needs.**

2. Matters relating to laws and regulations that may act as a barrier to education providers being able to offer qualifications that meet the needs of the new economy and fastest growing sectors.

In a study conducted by the Australian Council for Educational Research (ACER), exploring WIL practice at Australian universities, universities reported good adherence to the AQF in their WIL development to ensure WIL aligned with approved curriculum,

> "Uniformly across the country, academics were clear that the processes for developing WIL units were necessarily linked very closely with the processes for developing any kind of academic unit. The systems in place for undertaking development included close 'mapping' of unit objectives to the course

---

[15] ARC Centre of Excellence for Creative Industries and Innovation, Australian Creative Economy Report Card 2013, http://www.cci.edu.au/Creative_Economy_report_card.pdf

[16] CSIRO (2016) Tomorrow's Digitally Enabled Workforce, http://www.csiro.au/en/Research/D61/Areas/Data-for-decisions/Strategic-Foresight/Tomorrows-Digitally-Enabled-Workforce

objectives, ensuring graduate capabilities were covered, maintaining a balance with other units on offer in the degree and being able to justify that the course satisfied the Australian Qualifications Framework requirements for the qualification level at which it was pitched. In some cases (ICT and engineering in particular), the course development process also required adherence to external professional standards for accreditation, so alignment with these standards was built into the development process. These processes were viewed as being rigorous and fitting with standard practice across the sector." [17]

The ATN acknowledges that whilst universities need the right policy settings and assurances that our programs are of appropriate quality, accreditation bodies may be limiting curriculum innovation in degree programs to some extent, with flow-on effects to our ability to equip our graduates with the necessary skills for the jobs of today and of the future.

In the ATN's consultations with industry, we have identified the concern that university course approval processes are not agile enough to address skills gaps in the rapidly evolving technology areas. Given the structural shifts caused by the digital revolution and related emerging trends (e.g. cryptocurrencies and block chain technology in financial services), there is a need to work with industry to design and deliver shorter, more agile, 'pop-up' executive courses as an add-on to existing offerings. These courses do not necessarily have to be accredited and will be valued by businesses if they have a key role in identifying the critical skills and knowledge required in the industry. These executive courses could be refreshed as trends evolve. There are already examples of ATN universities responding in a timely manner to provide the courses that students and industry want. The university sector will continue to carefully assess course approval processes to be sure that they meet the dual purpose of attaining relevancy as well as academic rigour.

There is also opportunity to enhance skills and offer qualifications that meet the needs of the new economy and fastest growing sectors through the training of HDR students. The ATN's Industry Doctoral Training Centre (IDTC) is the perfect vehicle for this because students are actively engaged with industry while getting their PhD.

Extending the notion of industry-focussed activities to undergraduate students, internship opportunities also provide better opportunities for students to gain the skills valued by industry while they complete their degree. The ATN universities have long been committed to providing internships to students to broaden their educational experience and enhance graduate employability. ATN member university QUT exemplify this model, and in their submission highlight their initiative, InPlace which has helped place approximately 87,500 students into Work Integrated Learning opportunities.

Recommendation: Mandate accrediting bodies to prioritise curriculum innovation in degree programs, allowing universities to continue to equip graduates with the necessary skills for the jobs of today and of the future.

3.   Factors that discourage closer partnerships between industry; in particular small and medium enterprises, the research sector and education providers; including but not limited to: intellectual property; technology transfer; and rapid commercialisation.

---

[17] ACER (2015) Work Integrated Learning in STEM in Australian Universities, Australian Council for Educational Research, http://www.chiefscientist.gov.au/2015/08/report-work-integrated-learning-in-stem-in-australian-universities/ p, 48

Matters relating to innovation, and barriers to collaboration between the research sector and industry have been widely canvassed by Government, with more than 70 published reports and papers prepared by or for Government in the last 15 years.[18]

Briefly, the main factors limiting collaboration between small and medium enterprises and the research sector include:

- Misaligned reward and incentive structures at universities;
- Lack of funding available and/or risk appetite to take research along commercial pathways;
- Perceptions around ease of access to university IP;
- Australia's industry structure, made up of 97 per cent of small and micro-firms;
- Differing priorities and cultures of universities and industry; and
- Structural mismatch between Australia's industry base and the current areas of capacity and excellence in our universities.

For further discussion, the ATN would like to point the committee to the ATN's recent submission to Australia's Future in Research and Innovation[19] and the ATN/Ai Group *Innovate and Prosper* report published in early 2015.[20]

A number of these factors are being addressed as part of the Government's *National Innovation and Science Agenda*, suggesting that the Government is well versed in the barriers to innovation and research-industry collaboration, and have been effectively engaging with the relevant sectors to overcome the challenges.

4.   Relationships between tertiary education entrepreneurship programs and private incubator and accelerators.

Examples of the relationships between tertiary education entrepreneurship programs and private incubator and accelerators at ATN universities include:

- **The UniSA Innovation and Collaboration Centre (ICC):** this is a strategic partnership between UniSA, the Government of South Australia and anchor industry partner Hewlett Packard Enterprise. The ICC is set to help business and industry turn their ideas into market success. By leveraging world class technology through HP Enterprise and UniSA's expertise in business growth, creative thinking, commercialisation and technology, the ICC supports the lifecycle from idea generation to growth and expansion for students, businesses and industry. The

---

[18] Green, R. & Howard, J. H. (2015) Australia's Innovation Future: A Report on the Structure and Performance of Australia's National Innovation System, Attachment 1 to the Senate Economic References Committee Report on Australia's Innovation System, http://www.aph.gov.au/Parliamentary_Business/Committees/Senate/Economics/Innovation_System/Report, p. 62-64

[19] ATN (2016) Submission to Trade and Investment Inquiry into Australia's Future in Research and Innovation, http://www.atn.edu.au/siteassets/submissions/atn-trade-and-investment-submission.pdf

[20]ATN and Ai Group (2015) Innovate and Prosper: Ensuring Australia's Future Competitiveness through University-Industry Collaboration, https://www.atn.edu.au/Documents/Publications/Reports/2015/ATN%20Innovate%20and%20Prosper_web_version.pdf

Centre provides a multidisciplinary environment where SMEs, students and entrepreneurs can access a wide range of expertise to help them develop their products and grow their business.

- **Piivot, UTS:** Incubated at UTS's Ultimo campus – the nexus of a vibrant digital creative entrepreneurial ecosystem – Piivot is a collaboration between UTS, the NSW Government, Commonwealth Bank, Microsoft, engineering and design firm ARUP and Ultimo's co-working start-up Fishburners.

  Piivot offers start-ups, entrepreneurs, investors and students the opportunity to connect on opportunities such as internships, mentoring, research and knowledge sharing, industry and data mapping, and network building.

- **PwC Chair in Digital Economy, QUT:** The PwC Chair in the Digital Economy creates a seamless university-industry collaboration ecosystem that drives digital innovation through research, education, innovation services and industry advocacy. Importantly, the research and innovation services contribute to the ongoing re-invention of QUT's role in preparing graduates for the digital economy.

  Partners engage through one gateway with an investment that suits their strategy to gain access to this unique ecosystem. The PwC Chair also brokers collaborations between corporates, industry government and start-ups.

  The PwC Chair team draws on innovation specialists, postdoctoral fellows, researchers and academics with aligned expertise and research interests. This broad research proficiency is enhanced by PwC's applied and open innovation capabilities. Strategically linked with innovation and digital change, the PwC Chair brings the impact of evidence-based research together with industry and applied commercialisation experience in a unique collaboration to enhance innovation output and rigour in the digital economy.

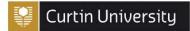 The aims of the PwC Chair are fourfold:

  1. Investigate the dynamics of the digital economy and how it impacts organisations and communities in Brisbane, Australia and the world.

  2. Inform industry, government, academia and students by developing and delivering internationally leading: tools, techniques, processes and management practices that enable new value creation in the digital economy.

  3. Increase participation, especially by newer and smaller firms, in the digital economy through education, services and advocacy.

  4. Stimulate economic growth and prosperity through incubating and scaling up new value creating ideas.

In addition to the models above, ATN universities also have a number of student initiatives aimed at tapping into and developing entrepreneurial skills and inspiring innovation. These initiatives are part of broader strategies aimed at improving the employability and adaptability of graduates. These are

presented in Appendix A.The ATN are happy to meet with the Committee or its members to discuss any elements of the submission further.

Please do not hesitate to contact the ATN Directorate on (08) 8302 9135 or via e-mail at.

Yours sincerely

Renee Hindmarsh

ATN Executive Director

Appendix A. ATN examples of student engagement on innovation

STUDENT ENTREPRENEURSHIP

Programs and courses

- **UTS Bachelor of Creative Intelligence and Innovation -** The Bachelor of Creative Intelligence and Innovation (BCII) is a unique combined degree that encompasses high-level critical and creative thinking, invention, complexity, innovation, future scenario building and entrepreneurship; leading-edge capabilities that are highly valued in the globalised world. Learn more...

- **RMIT Master of Design Innovation and Technology -** Taught within RMIT's Spatial Information Architecture Laboratory (SIAL), this Master by coursework program prepares students to be design leaders in a rapidly changing environment. Learn more...

- **UniSA's Bachelor of Business (Innovation and Entrepreneurship) -** The specialisation helps students to develop an enterprising mindset crucial for finding creative, innovative and useful solutions in business and social enterprises. Learn more..

- **QUT-PwC Disruptive Innovation Leadership Course -** This two-day intensive program is designed to empower leaders with the thinking patterns and practical skills to lead disruptive innovation activities, and to face rapid change and growing environmental uncertainty often caused by technological development. Learn more...

- **QUT, RMIT and Fairfax Media partnership on "Innovation in Modern Journalism" -** Fairfax Media have partnered with two of the country's best journalism schools to pilot a course which is designed to help students and educators keep better pace with newsroom innovation. The "Innovation in Modern Journalism" links students with day-to-day newsroom challenges and encourages journalists of the future to find new ways to engage with large audiences which are migrating to digital platforms. Learn more...

Student Innovation Competitions

- **RMIT's 2015 Fastrack Innovation Program -** Fastrack is a cutting-edge program that brings together top talent from across RMIT with innovative industry partners to collaborate on solutions to real-world challenges. Learn more...

- **UniSA STEM Innovation Challenge -** The UniSA STEM Innovation Challenge was created to encourage high school students to explore STEM subjects further as part of their career choices and to understand how higher mathematics is used in a real life context. Watch the video...

- **QUT Bluebox Innovation Challenge -** Aimed at helping aspiring entrepreneurs to take to the real world their innovation, the Innovation Challenge offers the chance to secure seed funding, garner publicity and potentially work with qutbluebox to take their innovation to the marketplace. Learn more...

- **Curtin Future Leaders Entrepreneurship Bootcamp -** Top teams and entrepreneurs have the opportunity to pitch to the US Ambassador and an industry judging panel for three $5,000 innovation grants.

- **UTS IBISWorld 3P Innovation Competition -** The competition gives students the chance to explore creative and innovative business ideas whilst being mentored by business professionals. Learn more...

Student Venture Funds

- **UniSA Venture Catalyst -** Venture Catalyst is an initiative of the South Australian Government and UniSA encouraging student entrepreneurship and the creation of local start-ups by providing funding for early-stage ventures founded by UniSA students and recent graduates. Applicants may apply for up to $50,000 seed funding to further develop a product, service or process and take it to market. Learn more...

- **RMIT New Enterprise Investment Fund -** The NEIF program has been established by RMIT so that students with business proposals that meet the criteria can apply for funding in the form of an interest-free loan and get their ideas off the ground. Loans are typically up to $25,000 and for a period of one to three years. Learn more...

- **Curtin Accelerate** offers a $5,000 equity-free grant, access to co-working space and facilities, access to networks of commercialisation experts, investors and potential partners, in addition to business start-up workshops and 10 weeks of personalised mentoring for individuals and teams to kick-start or accelerate an innovative business idea. Learn more...