15 DEC 2017

Senator The Hon Arthur Sinodinos AO
Minister for Industry, Innovation and Science
DigitalEconomy@industry.gov.au

Dear Senator Sinodinos

TAFE Queensland welcomes the release of the discussion paper *The Digital Economy: Opening up the Conversation* as part of the development of the Commonwealth Government's Digital Economy Strategy.

The enclosed response to the discussion paper, identifies the role the vocational education and training (VET) sector could play in the development of a strong digital economy. In particular, the submission highlights the following:

- That a life-long learning approach is supported by research and industry alike.
- To keep pace with the continually evolving digital technologies transforming Australian industries and skills needs, the VET training package review cycle needs to become more agile and flexible. This will ensure the VET sector can rapidly adapt to maximise the skills development necessary to compete in the digital economy.
- The Australian Government must establish a clear vision for the vocational and higher education sectors. This vision should include a comprehensive national approach to VET and stronger collaboration across the tertiary education sector, industry and employment data organisations.
- That TAFEs will continue to be part of a thriving, well-articulated vocational and higher education system, which skills and re-skills Australians as part of the continuous adjustment to digital disruption locally, nationally and globally.
- TAFEs are well-positioned to assist small to medium-sized enterprises to embrace digital innovation, build entrepreneurial skills and unlock further economic potential.

I look forward to TAFE Queensland's continued involvement in the consultation process and would be happy to discuss any aspect of the enclosed submission. Should you wish to do so, I invite you to contact me on (07) 3514 3601 or by email at Mary.Campbell2@tafeqld.edu.au.

Yours sincerely

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TAFE QUEENSLAND SUBMISSION

TO THE DEPARTMENT OF INDUSTRY, INNOVATION AND SCIENCE

RESPONSE TO: THE DIGITAL ECONOMY: OPENING UP THE CONVERSATION

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TAFE Queensland Submission to the Department of Industry, Innovation and Science

Response to - The Digital Economy: Opening up the Conversation

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Purpose

This submission is intended to inform the national conversation started by the Federal Government as part of developing a Digital Economy Strategy to improve Australia's productivity and competitiveness.

Introduction

TAFE Queensland appreciates the opportunity to participate in this national conversation and contribute to the development of the Digital Economy Strategy.

TAFE Queensland is the State's public provider of vocational education and training (VET). With over 130 years of history and through a state-wide network of institutes, TAFE Queensland is the most experienced provider of VET in Queensland. TAFE Queensland offers training through a variety of modes including traditional classroom delivery, distance learning, online tuition, workplace training and a blended delivery method combining two or more delivery modes.

TAFE Queensland continues to be the largest provider of VET services in Queensland with over 122,000 students (including 7,390 international students) choosing to study with TAFE Queensland in 2016/17. During this period a total of 41,600 qualifications were awarded ranging from statements of attainment to bachelor degrees across more than 500 program areas. TAFE Queensland delivers high quality outcomes for students and employers, with:

- Competency completion rates at close to 90%;
- Students employed or in further study at 86%;
- Student satisfaction at 87%; and
- Employer satisfaction at 93%.

Students from over 110 countries choose to study with TAFE Queensland in Australia and abroad due to its international profile, world class standard of training, state-of-the-art facilities and the wide range of programs offered.

TAFE Queensland is also the official training partner for the Gold Coast 2018 Commonwealth Games (GC2018), delivering bespoke training to 15,000 volunteers who will perform up to 200 different roles during GC2018.

In looking to the future, TAFE Queensland recently partnered with the CSIRO to identify the changes impacting different occupations and how VET can transform to help capture and support economic growth into the future. The report, *The VET ERA: Equipping Australia's workforce for the future digital economy* recognises that demand for VET will increase as new industries emerge and new entrants to the labour market and existing workers skill and re-skill to meet demand, improve productivity and enable greater competitiveness.

Summary of Key Points

TAFE Queensland's response makes the following key points:

1. That a life-long learning approach is supported by research and industry alike. Policy and funding frameworks underpinning the VET sector need to be adjusted to support this standpoint.

2. To keep pace with the continually evolving digital technologies that are transforming Australian industries and skills needs, the VET training package review cycle needs to become more agile and flexible. This will ensure the VET sector can more rapidly adapt to maximise the skills development necessary to compete in the digital economy.

3. The Australian Government must establish a clear vision for the vocational and higher education sectors. This vision should include a comprehensive national approach to vocational education and training and stronger collaboration across the tertiary education sector, industry and employment data organisations.

4. That TAFEs will continue to be part of a thriving, well-articulated vocational and higher education system, which skills and re-skills Australians as part of the continuous adjustment to digital disruption locally, nationally and globally.

5. TAFEs are well-positioned to assist SMEs to embrace digital innovation, build entrepreneurial skills and unlock further economic potential.

1. Response to Questions

To assist with analysis, this submission is structured to align with questions posed in the discussion paper *The Digital Economy: Opening up the Conversation*. Rather than respond to all questions, this submission offers responses to questions of most relevant to TAFE Queensland and the vocational education and training sector.

***Question 1**: How are advances in digital technology changing the way you work, your industry and your community?*

As part of its commitment to innovation and change, TAFE Queensland established its Centre for Applied Research and Innovation, known as RedSpace, in 2015. In building on this commitment, in 2016 TAFE Queensland partnered with CSIRO to produce the report *The VET Era: Equipping Australia's workforce for the future digital economy*.

The report leveraged CSIRO's work on megatrends to explore how the vocational education and training (VET) sector can best support Australia's future workforce. The report found that:

- the role of VET sector will be critical in responding to significant and ongoing disruption;
- workers will be increasingly required to have advanced skills;
- lifelong learning will be vital and funding frameworks will need to adjust to reflect this;
- variability in quality across the VET sector must be addressed and replaced with greater agility and capacity to tailor training to suit demand;
- digital technology will be increasingly important in delivering education and training, both to support student competency and to provide a richer learning environment; and
- educators will remain critical and face-to-face teaching will remain important, with educators using digital tools to enhance student outcomes.

The report has broader application across the VET sector and is helping to inform a growing conversation about the need for a clear vision for vocational and higher education in Australia. At the State level, the report has been used by TAFE Queensland to reshape its strategic direction and develop a roadmap to further guide the organisation on its journey as a recognised innovator in vocational education and training.

In line with this research, the Productivity Commission[1] recently noted how digital technology is restructuring industries and markets globally, as well as challenging existing industry classification systems. For example, Australia's XM2 has drone crews and technicians operating and innovating across industry sectors like Motion Picture (film crew), Manufacturing, Electricity generation (wind turbine maintenance, and manufacture of drone rigs), and Retail (online sale of drones).

As noted by the CSIRO[2], this adjustment means that employment data ecosystem will also need to change to assist employers, industry and government to better anticipate supply and demand issues in an ever-changing labour market.

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[1] Productivity Commission (2017) *Shifting the Dial: 5 year productivity review – supporting paper No. 8 – upskilling and retraining*, Canberra

[2] CSIRO (2017) *Employment Data Ecosystem: Equipping Australians with the information they need to navigate the future labour market*, CSIRO: Queensland

While this pace of change is rapid, the rigidity of training package development continues to hinder adjustment, with the package review cycle seen as lengthy and too inflexible to allow quality providers like TAFEs to incorporate new practices, new technologies and the iterative innovations industry needs to remain competitive in a globalised market. While TAFEs accredited as higher education providers may apply to the Tertiary Education Quality and Standards Agency (TEQSA) for authority to self-accredit courses, this does not necessarily provide the level of flexibility needed to respond to skills demand in Australia or in countries like India where more than 12 million young people are projected to join the workforce annually.

For both the vocational and higher education sectors, digital technology is also enabling growth in Massive Open Online Courses (MOOCs), Maker Spaces and peer-to-peer learning businesses, such as Lynda, Degreed, ADX Portland and Work-Shop. While this change highlights the growing capacity of the market to respond to consumer demand for micro-skills, community education, access to equipment and entrepreneurial support, much of this learning is informal, not assessable and sits outside current regulatory efforts that assure training quality and enable well-articulated pathways between school-based and vocational and higher education qualifications.

But, while consumers will continue to demand bespoke online solutions, the Productivity Commission[3] recently signaled that it sees MOOCs and other online-only models as having the potential to reduce the costs of vocational and higher education, even though completion rates for MOOC courses remain low[4]. However, MOOCs and digital channels are increasingly being used by higher education and VET providers to build skills sets and skills pathways.

As one example, TAFE Queensland has worked with industry partners and clients to provide 15,000 volunteers with transferable skills and future opportunities to gain accreditation and employability which will provide long term benefits to Queensland employers and the community more broadly. For the first time in the history of the Commonwealth Games, all volunteers will participate in a component of online learning, delivered on both mobile and online devices.

Such change also means that the vocational and higher education teaching workforce "needs to be supported to build the capability required to deliver new and innovative teaching practices that respond to tomorrow's workforce skill needs."[5]

***Question 2**: What is your vision for an Australia that thrives in the digital economy? Where would you like to see Australia in five, 10 and 20 years' time?*

In five to 10 years' time the vocational education and training sector's strong industry links and practical workforce outcomes will be being used to help drive innovation and creativity in the economy.

TAFEs and other quality providers will also be fully enabled to co-create and customise training products; providing the flexibility needed to innovate and to meet market demand into the future, while maintaining quality for local as well as international consumers.

Within Australia's skills ecosystem, TAFEs will continue to be a locally, nationally and internationally recognised and trusted anchor institutions, contributing to regional economies and Australia's reputation as a destination of choice for quality vocational and higher education. Employers and

[3] OpCit
[4] https://www.economist.com/news/special-report/21714173-alternative-providers-education-must-solve-problems-cost-and
[5] CSIRO (2016) *The VET ERA: Equipping Australia's workforce for the future digital economy*, TAFE Queensland

industry will also readily associate the TAFE 'badge' with job-ready, entrepreneurial graduates trained via a skills system which links students to industry and real jobs.

As TAFE is also the "dominant provider of government-funded training across the majority of programs associated with key priorities for state and territory governments" and in rural and regional markets[6], this will continue to be a strength.

In 5 to 10 years time, TAFE Queensland expects the number of apprenticeships and traineeships available to have grown, with TAFEs playing a pivotal role in supporting the growth in both commencements and completions, particularly in regional areas. As companies like MX3D[7], Winsun Global[8] and Local Motors[9] are already changing apprentice reliant industries like manufacturing and construction, TAFE Queensland acknowledges that the nature of apprenticeships and traineeships will continue to change and evolve into the future.

In the short- and long-term, TAFEs will also continue to be pivotal in enabling collaboration across the tertiary education sector – connecting local businesses to applied research, commercialisation skills and networks which enable businesses to help bridge the 'valley of death' gap between product development and commercialisation often faced in innovation ecosystems.

In 10-15 years, TAFEs will also be part of a thriving, well-articulated vocational and higher education system, which is a key enabler of the Government's life-long learning policy; with distributed ledger technologies, (such as Blockchain, Credly) used to track, stack and validate formal and informal training and link students to industry, employment and opportunities to compete for acclaimed awards that enable them to benchmark their skills internationally (such as WorldSkills).

The latest results from the Australian Skills Quality Authority (ASQA) stakeholder survey indicate that co-regulators (state and federal government agencies) do not view ASQA's consultation and engagement positively, with data indicating a need for stronger and faster regulation of low quality RTOs.[10] In the short-to medium-term, monitoring and auditing of vocational and higher education activity will also be made easier and potentially fraudulent or low quality activity easier to detect and respond to, as regulators themselves innovate.

***Question 3**: What is the role of government in achieving that vision?*

Australia's skills ecosystem is multifaceted, and TAFE Queensland acknowledges the complexity of the vocational and higher education sectors.

Reforms, particularly over the past decade, have changed the very nature of these sectors, and produced challenges – particularly for TAFEs – that need to be addressed in the short- to medium-term.

While investment in skilling to improve productivity and competitiveness remains a vital role for government, a clear vision alongside a comprehensive national approach to vocational and higher education would assist in building well-aligned, innovative vocational and higher education sectors, providing employers and industry with the agile workforce needed now and into the future.

The vocational and higher education sectors are complementary and critical to ensuring that the workforce remains well-equipped with the skills and capabilities to meet the future needs of the economy.

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[6] NCVER (2015) *Analysis of TAFE's role and performance in the broader VET system*
[7] http://mx3d.com/about-2/
[8] http://www.winsun3d.com/en
[9] https://localmotors.com/
[10] https://www.asqa.gov.au/sites/g/files/net3521/f/asqa_rto_survey_2017_overview.pdf

For anchor vocational education institutions like TAFEs to continue to succeed, the Australian Government must work with them, so regulatory frameworks and investment in skilling is geared to:

- maintaining the highest quality standards;
- remaining focused on achieving real outcomes for individuals, employers and industry; and
- providing a real return on investment for individuals, employers, government and communities.

As major research, industry reports (such as the recent Business Council of Australia report)[11] and key stakeholders like the Australian Industry and Skills Committee point to lifelong learning being increasingly critical to enabling structural adjustment and sustainable growth, government policy and funding frameworks underpinning the vocational and higher education sectors will need to adjust to reflect this – enabling both sectors to become more agile and responsive to demand.

A regulatory framework which safeguards vocational and higher education quality while encouraging and enabling product and delivery innovation will better support growth of Australia's digital economy. This means recalibrating the current qualifications framework to achieve a better balance between national consistency and localised flexibility, and TAFE Queensland welcomes efforts to foster a responsive and agile system which recognises TAFE's role in driving and delivering industry-driven, quality VET.

Greater competitiveness would also require a review of the current reforms proposed through the Higher Education Reform Bill – reforms which, if passed in their present form, would enable VET students in approved sub-bachelor qualifications to access a Commonwealth Supported Place (CSP) if studying at university, but not if undertaking a sub-bachelor qualification outside of the public university system. This would put regional students without access to universities at disadvantage while also limiting competition and stifling innovation.

***Question 4**: What key disruptive technologies or business models do you see? What do you predict is on the horizon in five, 10, 20 years' time?*

Big data, and technologies such as artificial intelligence, robotics, nanotechnology, additive manufacturing[12], and genetics and biotechnology are already disrupting labour markets, industry structures, supply chains, governance and regulatory structures. As noted by Fujitsu in their latest *Fit for Digital* report:

> *Monumental, irreversible change: digital disruption has swept through business the world over and left no stone unturned. From whipping up a lightning fast pace of change to reshaping the dynamics of industry and competition, the transformative impact of digital disruption is being felt by every organization in every sector.*[13]

For the vocational and higher education sectors, this means TAFEs being part of a renewed and innovative skills ecosystem which better manages unnecessary 'credential inflation' and enables jobseekers, employees and businesses to skill and re-skill as required to maintain their participation in the labour market and the growing digital economy. This is also consistent with the Business Council of Australia's vision of an Australia with a culture of lifelong learning, and a universal education system across schools and the vocational and higher education sectors[14].

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11 http://www.bca.com.au/publications/future-proof-protecting-australians-through-education-and-skills

12 https://www.mckinsey.com/business-functions/operations/our-insights/digital-manufacturing-the-revolution-will-be-virtualized

13 Fujitsu (2017) *Fit for Digital: Co-creation in the Age of Disruption*, Fijitsu, P 22

14 Ibid

And with the advent of intelligent products like Amazon's Alexa and Google Home, super apps and bots:

> *…will induce new kinds of business integration and cooperation, based on dynamic connections between bots and relying on collaboration and continuous learning: the first internet was based on hyperlinks between static pieces of content and the second/mobile internet was based on sharing (little) content between apps. Bots will collaborate through intents on our behalf and will benefit from each other and their increased level of service.*[15]

While increasingly granular data drawn from such devices will provide vital analytics to proprietary businesses, partnerships and strong relationships with industry will remain vital no matter what the disruption. In 2016-17 TAFE Queensland strengthened partnerships with large enterprises like Aurizon, Volvo Group, Grand Central Shopping Centre, Queensland Rail, Ramsay Health, Gold Coast Hospital and Health Service and Star Entertainment, and built and continued hundreds of local partnerships with the small business sector that drives the Queensland economy.

Of relevance here, the Australian Government's Office of the Chief Economist recently released research on entrepreneurship dynamics in Australia from 2002 to 2015. This research notes that while small young firms remain the main engine of jobs growth in Australia, the rate of firm entry to market has been declining since 2005. While this highlights the risk to job creation, productivity and innovation it equally highlights the need to build entrepreurship skills and supports in as part of an overall approach to building competitiveness and productivity if this decline is to be reversed over the next 5 to 10 years and the broader economy is to benefit from the kind of entrepreneurship that ends up 'transforming markets and generating numerous jobs for others.'[16]

***Question 5**: What communication services, and underlying data, platforms and protocols, does Australia need to maximise the opportunities of digital economy?*

Organisations like the National Centre for Vocational Education Research (NCVER) and the Australian Bureau of Statistics (ABS) are critical institutions, providing open access to data which enables governments and anchor institutions like TAFEs to analyse trends and forecast future states. The value of such institutions is likely to grow, particularly in an environment where aggregate data owned by private for-profit technology companies with powerful data infrastructure, is not public data[17].

As noted by the CSIRO[18], improvements to Australia's employment data ecosystem are also necessary so government, the vocational and higher education sectors, private sector organisations, researchers and others can "obtain real-time insight into job demands and student pathways."[19]

> *With the data provided by digital technology, there is potential to track students over time as they participate in training and capture their activity and development via a virtual "educational passport" rather than a standardised qualification.*[20]

Platforms which draw on technologies such as distributed ledgers (e.g. Credly, already in use by some Australian universities) may play a role in enabling the vocational and higher education sectors to more easily recognise, validate and 'badge' micro-credentials. This could also change recognition of

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15 https://www.capgemini.com/2017/11/bots-will-drive-wave-of-disruption/

16 Bakhtiari, Sasan (2017) *Entrepreneurship Dynamics in Australia: Lessons from Micro-data*, Australian Government: Officer of the Chief Economist

17 https://www.technologyreview.com/s/533856/who-owns-big-data/

18 CSIRO (2017) *Employment Data Ecosystem: Equipping Australians with the information they need to navigate the future labour market*, CSIRO: Queensland

19 CSIRO (2016) *The VET ERA: Equipping Australia's workforce for the future digital economy*, TAFE Queensland

20 Ibid P25

prior learning (RPL) and assessment and audit practices as such technologies will enable greater collaboration and 'passporting' of qualifications and recognition of on-the-job learning across schools, the vocational and higher education sectors and industry.

***Question 6**: What opportunities do we have to accelerate the development of technologies that will underpin Australia's digital economy?*

As digital innovation continues to change the structure of markets and industries, "... roughly seven in ten people are currently in jobs where we simply cannot know for certain what will happen."[21]

But, the uptake of new technologies by business and industry across Australia is slow, with 80% of small to medium-sized enterprises (SMEs) delaying the adoption of technologies that could offer long-term benefits. An increase in the speed of uptake is likely to assist in accelerating the further development of technologies to meet demand as it changes and grows.

To accelerate the adoption and development of technologies, TAFEs will play a key role in skilling and re-skilling individuals, employers, technicians and professionals to understand and apply digital technologies.[22]

***Question 7**: What opportunities do we have in standards development and regulation to: Enable digital entrepreneurship, innovation and trade? Mitigate the risks associated with digital disruption?*

The increasing pace of change in the job and skills market paired with increased learner and employer expectations demands product agility in regard to vocational and higher education.

A skills ecosystem which includes a qualifications (standards) framework that provides for greater agility in product development and delivery, necessitates:

- clarity on VET Policy (nationally);
- innovation and the adoption of new technologies to support agile audit practices which account for innovation in delivery and assessment;
- recognition and greater promotion of the VET sector's strong links with industry, which culminate in real partnerships and tailored approaches to training delivery;
- support for applied research and development to enable innovation in the skills ecosystem at the VET level; and
- capacity for TAFEs and other public providers to self-accredit in order to respond more flexibly and rapidly to local, national and international demand for skills.

Processes to develop and approve technical standards will also need to ensure new technologies (such as Augmented and Virtual Reality) can be integrated into training packages and more easily adopted and adapted by business and industry without locking them in to costly proprietary solutions.

***Question 15**: What would help Australian business to embrace digital technologies?*

Most recently, the Foundation for Young Australians analysed 4.2 million job advertisements between 2012 and 2015. Analysis shows that the predicted changes are already here.

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[21] Bakhshi, H., Downing, J. M., Osborne, M. A., and Schneider, P. (2017) *The Future of Skills: Employment in 2030*, Pearson, NEST and Oxford Martin School: UK, P13

[22] Op Cit

More employers are demanding enterprising skills among young employees. Demand for digital skills went up 212% over three years, while critical thinking increased 158%, creativity increased by 65% and presentation skills by 25%.[23]

It is, therefore, critical that Australia's workforce is competitive to address this demand. This can only be achieved by ongoing access to high quality vocational and higher education sectors which enable Australians to skill and re-skill.

In working to better skill his workforce, James Caldwell, CEO of Hembrow's Electrical Service partnered with TAFE Queensland, noted "*if you haven't educated your workforce you can't help your customers compete with offshore competitors*."[24]

CSIRO[25] research also highlights the need for agile and adaptable vocational and higher education sectors as the sectors are key enablers of emerging industries, new technologies and new ways of working, in addition to retraining and upskilling our workforce.

The Federal Government supports Australian business to embrace digital technologies through strategies such as:

- supporting the development of architecture standards and developing digital regulations;
- enhancing business and consumer confidence through improved cybersecurity and access to communications infrastructure;
- a commitment to net neutrality; and
- improved business to government digital engagement, including the National Business Simplification Initiative.

These initiatives help to provide a stable and predictable environment for businesses engaging in the digital economy. But, as Australian businesses are slow to invest in digital technology capabilities, the VET sector's success in engaging with business and industry and with skills development will remain critical to assisting SMEs to take up the opportunities such a stable and relatively predictable environment affords.

***Question 16**: What efforts are you or your organisation making to respond to digital transformation? Why?*

In TAFE Queensland, The *Learning Futures 2020 Roadmap* is in place to provide a framework of key enablers and initiatives that aim to:

- Increase digital delivery capability across TAFE Queensland encompassing the functional capability and performance of digital infrastructure, and educator digital competency
- Increase the ability of TAFE Queensland to be innovative, responsive and competitive in fitting student for the current and future demands of the digital workforce.

The Roadmap was informed by the *Learning Futures 2020 Background Paper* which identified three recurring drivers to successfully service the needs of future learners:

- the need to be agile and responsive;

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[23] FYA (2017) *The New Basics: Big data reveals the skills young people need for the New Work Order*, Foundation for Young Australians: Sydney

[24] http://tafeqld.edu.au/resources/pdf/about-us/redspace/ARIES-CASE-STUDIES-2016-FULL-WEB-R.pdf

[25] CSIRO (2016) *The VET ERA: Equipping Australia's workforce for the future digital economy*, TAFE Queensland

- personalisation of learning; and
- the need for relevance to the current and future job market.

The need to be able to learn at any time, to acquire stackable credentials and relevance to future job-fit are drivers of greatest concern to our current learners. The literature and economic transition indicates this trend will become stronger and requires increased focus across VET.

In 2016, TAFE Queensland also worked with CSIRO[26] to map research and trends that may impact on future workforce needs. The research found a strong correlation between TAFE Queensland training and job vacancies – reflecting our responsiveness to workforce change. This research has been used to inform strategic and operational planning and further research and workforce planning projects.

TAFE Queensland is further working with the Queensland Department of Education and Training on projects which will enhance delivery in:

- mechatronics, automation and robotics training; and
- 3D environment scanning, and the use of drone technology.

Aviation Australia, established by the Queensland Government in 2001, recently merged with TAFE Queensland to ensure delivery of workforce solutions across the aviation and aerospace industry. This will also ensure that quality training is in place to help support and drive implementation of the developing drone industry.

***Question 17**: What opportunities do we have to use digital technologies to improve linkages into export markets and global supply chains?*

In 2016-17, TAFE Queensland International's business development and partnerships teams achieved:

- Over 250 inbound delegates as part of study tour programs, government and vocational school visits;
- In-country teacher training workshops to promote and enhance their understanding of the Australian VET system;
- Formalised education pathways for offshore students to study diploma to degree pathways;
- Delivery of the International Training and Assessment Course (ITAC) as part of the Asia-Pacific Economic Cooperation (APEC) Transport and Logistics Project; and
- Partnership with Dingo Software Pty Ltd, an intelligence expert service company specialising in predictive maintenance, to deliver Dingo's predictive maintenance software to mining clients across the world. TAFE Queensland and Dingo successfully delivered a joint workshop in Mexico, which attracted over 50 mining companies, receiving significant media coverage in the country.

Digital technologies support and amplify the development and maintenance of such partnerships which improve linkages to export markets and global supply chains.

***Question 18**: What opportunities do small and medium-sized businesses have to embrace digital innovation to drive customer value, improve their services and unlock their potential?*

Many challenges faced by employers relate to emerging technologies, and students are able to make recommendations that, when implemented in the workplace, create some form of innovation. This

[26] Ibid

form of applied learning and applied research is TAFEs strength. It generates highly positive outcomes for learners, employers and TAFE Queensland teachers.[27] For example, students gain workplace experience and a project deliverable for their portfolios, employers are exposed to future staff, and these projects strengthen the bond between TAFEs and local employers.

TAFE Queensland is working with advanced manufacturers across the State to pilot the use of augmented reality for machine maintenance. Our students have delivered 3D Virtual Reality tours of manufacturing plant sites (to save travel and OH&S expenses). In Far North Queensland we are using drones in agriculture. Feedback from employers is consistently highly positive.

Funding for a national ecosystem of TAFE Activity Centres that become community spaces for professional networking, experimentation and applied research would assist SMEs with:

- informal peer to peer learning and experimentation with industry;
- entry points to formal courses;
- cross-pollination of ideas between disciplines; and
- fostering emerging and innovative industries and strengthen our regional economies.

Funding may combine government and industry sources, as happen in the agricultural research and development space. Of note in relation to prospective government funding, the Commonwealth House of Representatives (2017, Recommendation 29) Inquiry 'Innovation and creativity: workforce for the new economy' recommended that the Australian Government consider the merit of adopting elements of Canada's Applied Research and Innovation Services model with a view to strengthening connections between VET providers and SMEs via a $50 million fund over four years which is specifically targeted at funding collaborations between the VET sector and business. This is supported by Beddie and Simon[28], in their analysis into the VET system and innovation.

***Question 19**: What are the key new growth industries that Australia should be tapping into? In what technologies and sectors should Australian businesses take the lead, and where should we be a 'fast follower' of international trends?*

While the automotive industry in Australia has suffered a rapid decline, the development of rapid fabrication techniques enabled by 3D printing and nano-technologies may see a revitalised manufacturing sector.[29] With the advent of micro-factories (like Local Motors in the US)[30], it is possible for manufacturing resources to be spread across regions to enable rapid delivery of high-value products which will take a matter of days to produce.

In regard to the National Disability Insurance Scheme (NDIS), there "will be opportunities for Queensland's advanced manufacturing businesses to provide assistive technologies, which include any device, system or design that assists individuals carry out daily living activities."[31]

These technologies are also already restructuring the building and construction industry, with greater moves to off-site, rapid fabrication. McGraw-Hill Construction, notes that:

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[27] TAFE Queensland Submission to the House of Representatives Standing Committee on Education and Employment Inquiry into innovation and creativity: workforce for the new economy (2016) http://tafeqld.edu.au/resources/pdf/about-us/research-papers/SUBMISSION-Innovation-and-Creativity-Inquiry.pdf

[28] Beddie, F. & Simon, L. (2017) *VET applied research: driving VET's role in the innovation system* National Centre for Vocational Education Research, Adelaide

[29] https://www.statedevelopment.qld.gov.au/resources/plan/advanced-manufacturing/advanced-manufacturing-roadmap.pdf

[30] https://localmotors.com/

[31] Op Cit P11

Recent innovations over the past few decades have allowed the prefabrication and modular construction industry to make significant advances in developing processes and materials to build and deliver more sophisticated and complex facility types.[32]

McGraw-Hill also notes that 'Australia and New Zealand are among the world's leading regions for building information modelling (BIM), with firms planning to deepen their involvement' and accelerate adoption.[33]

Consequently, design, materials testing and accreditation skills may grow in importance, as consumers demand increasingly bespoke products and services which suit their needs, but meet rigorous production and safety standards.

Games and gamification

The discussion paper highlights opportunities for innovative games development and the use of gamification in areas such as medicine, health and education.

Demand is already forging co-creation partnerships and pathways. For instance, TAFE Queensland has partnered with University of Canberra to deliver the Bachelor of Games and Interactive Design. With teaching and Learning in this degree able to be adapted to the development of applications in medicine, health and education.

Research recently undertaken by CSIRO for Jobs Queensland and TAFE Queensland, highlights the opportunities this opens up in areas like the Fraser Coast which is experiencing growing demand for health and aged care services.[34]

Question 20*: What opportunities do we have to equip Australians with the skills they need for the digital economy, today's jobs, and the jobs of the future?*

The vocational and higher education sectors will be critical

Identifying the skills needed to both drive and support the future Australian economy is a critical requirement of the vocational and higher education sectors. Central to this is ensuring that the product that the sectors offer are aligned to current and future needs and can be adjusted and realigned as demand changes.

As all major research points to lifelong learning becoming more important for sustaining economic adjustment and growth, the policy and funding frameworks underpinning the vocational and higher education sectors will need to adjust to reflect this – enabling both sectors to become more agile.

TAFE Queensland notes the importance that these groups must place on ensuring that training packages are, as much as possible, future proofed and providing students with the skills necessary to partake and drive the future economy.

There are multiple reports which consistently point to a need for significant improvement in the way high school students and others access career advice and identify vocational and higher education pathways suited to their skills and interests.

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[32] https://www.nist.gov/sites/default/files/documents/el/economics/Prefabrication-Modularization-in-the-Construction-Industry-SMR-2011R.pdf P9.

[33] http://www.consultaustralia.com.au/docs/default-source/bim/the-business-value-of-bim-in-australia-new-zealand.pdf P4.

[34] CSIRO (2017) *Growing Opportunities in the Fraser Coast: Informing regional workforce development*, Brisbane

In October 2017, the Productivity Commission reiterated this position, adding that the proliferation of websites targeted at assisting students and others to navigate their training pathways, also exacerbated the problem[35].

Training packages and skill sets

A persistent theme in the VET and tertiary sector market research is future-Job fit: providing learning experiences and qualifications that prepare students with the capabilities and skills needed in the future workforce, which could include STEM subjects and digital literacy and enterprise skills.[36]

Technologies and trends that support this theme include: open micro-credentials, industry integration through applied research projects and work experience as part of the curriculum, and the trend to competency-based learning which is growing overseas.

Training packages delivered by Australia's VET sector will need to rapidly adapt to maximise the skills development necessary to compete in the digital economy. The following would assist in equipping Australians with the skills they need for a digital economy:

1. New training packages which equip Australians with:
    a. Management and business skills in digital entrepreneurship (including communication, digital literacy, and communication), computational law, and Australian & international digital standards; and
    b. Technical skills in implementing and managing digital infrastructure, cloud computing, cybersecurity, robotics and Artificial intelligence, and ledger technologies (like Blockchain) which remove transaction intermediaries.
2. The VET system should also include digital economy electives in areas of training where Australia has a competitive advantage, including agribusiness, manufacturing, mining equipment, pharmaceuticals and medical technologies, financial and insurance services, and energy resources.
3. A renewed emphasis on promoting a culture of lifelong learning and which highlights the benefits of participating fully in the digital economy. This would support the national Digital Economy Strategy by driving a 'culture and mindset that supports lifelong learning, a global outlook and helps us respond positively to change'.
4. Language education necessary to remove global language barriers when engaging in business in the Asia-Pacific region.

Improving the skills to choose career paths

Enabling students in primary and high school to better identify their goals and possible career paths is a first step in equipping Australians with the skills they need.

Following a successful pilot in 2016, TAFE Queensland's #DiscoverMyFuture Program was rolled out to Year 9 students state-wide in 2017. Additionally, through the Discover My Career Program, TAFE Queensland further engaged over 20 private and public secondary schools in the program targeting Year 10 students prior to the development of their Senior Educational Training (SET) plan.

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[35] Productivity Commission (2017) *Shifting the Deal: Supporting Pape No. 8 – Upskilling and Retraining*, Canberra
[36] FYA (2017) *The New Basics*, Foundation for Young Australians, Melbourne

Both programs were developed in response to a growing recognition in high schools and universities that there is not enough information and advice for students prior to Year 11 to make informed decisions about their future education investment and career pathways.

Evaluation of the #DiscoverMyFuture Program found clear benefits for students, parents/caregivers and teachers. In particular, students were better able to articulate their skills, interests and career pathways, while teachers saw improvements in their student's understanding of career possibilities and study pathways.

Students said:

> *It was awesome… I feel more informed on the possibilities.*
>
> *…it was a good session that helped me learn more about my future career.*
>
> *I really enjoyed it. It helped me identify what paths I could choose.*

While teachers said:

> *Students were highly engaged… A good idea to have students thinking about careers earlier.*
>
> *Many students have mentioned that they have continued thinking about the discussions had in the lessons.*
>
> *This is a great beginning for decisions [that] need to be made for year 10.*

***Question 21**: What opportunities do we have to bridge the 'digital divide' and make the most of the benefits that digital technologies present for social inclusion?*

As noted by Education International "vocational education's role is all the more important to individuals, groups and societies who suffer the most economic and social disadvantage and are most vulnerable."[37]

In the digital economy, TAFEs will continue to enable all governments to meet their obligations to provide vocational education across all communities.

As part of this, micro-credentialing will grow to support life-long learning, enabling:

- all Australians to improve their competitiveness in the digital economy in ways that best suit them;
- new pathways to gaining accredited training and the skill sets needed to compete in an ever-changing labour market, or to develop as an entrepreneur; and
- the development of content which opens up new learning and business opportunities, for example content which enables Indigenous Australians to preserve and share languages, stories, and traditional knowledge (e.g. of medicines and bush foods) locally, nationally and globally.

***Question 22**: What opportunities do we have to ensure digital technology has a positive impact on the cultural practices and social relationships of Australians?*

In 2016-17, TAFE Queensland, Energex and BUSY at Work partnered to deliver the Indigenous Bright Sparks Program. The 16 week pre-apprenticeship program provided Aboriginal and Torres Strait Islander

[37] Education International (2016) *Global Trends in TVET: A framework for social justice*, Brussels: Education International

students the opportunity to learn the basic skills and competencies that will help them to obtain an electrical apprenticeship.

Such partnerships not only build the human, social and cultural capital within communities and regions, they enable the development of further opportunities to build skills and innovate.

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