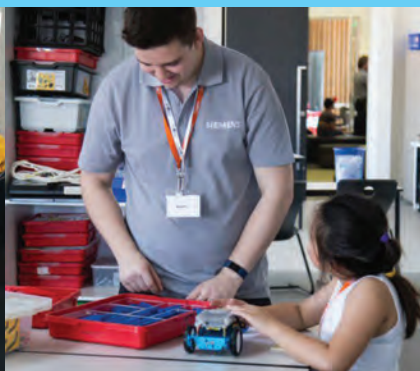




TAFE Working with Industry

Case Studies



Introduction and overview

TAFE is defined by its symbiotic relationship with industry and community. From a beginning in apprenticeships with the traditional trades, TAFE Institutes have responded to the changing definition of *industry* by building relationships with industry and employers across the wide range of employer requirements for learners across a similarly wide range of job outcomes and qualification levels.

The My Skills website (www.myskills.gov.au) provides a summary of interaction across government, industry and training providers.

The VET sector is based on strong partnerships between governments, VET institutions and industry bodies. Governments provide funding, develop policies, and provide regulation and quality assurance of the sector. Industry and employer groups contribute to training policies and priorities, and the development of qualifications to deliver skills to the workforce.

Five TAFE providers showcased examples of their recent and successful engagement with industry at the 2018 VTA Conference. The detail of each is provided in the following case studies.

- **Holmesglen Institute and the Electrical Trades Union: Futuretech industry collaboration.**
- **RMIT University and Apple: digital skills for the 21st century.**
- **Wodonga TAFE and the Australian Defence Force: Defence Medics Partnership.**
- **SuniTAFE and Agromillora: Harvesting Productive Relationships.**
- **Swinburne University, AiG and Siemens: Industry 4.0 – Higher Apprenticeship Partnership Project.**

Each case study addresses a different dimension of the ways in which TAFEs engage with government policy and initiatives and with industry partners to deliver real employment outcomes for their community.

The common territory across the case studies is represented in recurring themes:

- Real partnerships in which stakeholders including industry groups, employers, unions, community organisations and government providers engage with the TAFE Institute to be accountable for and manage the delivery of course/s that will deliver an employment outcome for learners and valued enterprise skills for employers.
- A flexible approach to the design and delivery of education and training courses in which the background, needs and desired outcomes of learners and employers are the primary considerations.
- The active input of employers and industry into the content, facilities, resources and assessment of learners in the course.
- A future focussed view of the employment landscape that identifies the critical knowledge and skills that are required by the workforce in each industry and also across industry sectors.
- The importance of investment in the knowledge and skills of teachers in both technical and education contexts.



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Holmesglen and ETU: Futuretech industry collaboration

Futuretech was developed in response to the Industry Skills Council's recommendation for the establishment of an innovative hub – a training facility that could pilot innovative programs reflecting the changing needs of a technologically advanced industry.

The first of its kind in Australia, Futuretech is a contemporary integrated training facility specifically for the electrical and electrotechnology industries. Currently offering 19 accredited and professional development courses in electrotechnology, telecommunications, and OH&S, Futuretech delivers industry-informed specialist training from pre-apprenticeship through to professional development for the electrotechnology industry.

Futuretech was clearly defined by the collaborating parties who determined that it should:

- become the industry benchmark for best practice and innovation.
- consult industry in curriculum development to ensure courses meet industry needs.

- exemplify safe work practices and promote strong OH&S principles.
- raise the professionalism and safety of the industry through ongoing professional development programs.
- encourage young people to enter the industry to meet significant skills shortage.
- be a platform for transitioning displaced workers to new careers in emerging telecommunications and electrotechnology industries.
- advocate for industry to adopt renewable and sustainable energy forms.
- produce students who leave work ready for Victoria's rapidly changing landscape and projects.
- be a one-stop-shop for training from the pre-apprentice through to professional development training and specialised upskilling courses.

By reporting its outcomes through various industry bodies, including Clean Energy Council Accreditation team and SEIA Vic, Futuretech contributes to advancement in electrical and electrotechnology training.

Research findings are shared with industry organisations such as Clenergy, Selectronic, DKSH and DPA Solar including new supporters like Solar Edge, Fronius, Enphase, Aquion, Victron, and Delta Energy.

The longer-term vision for Futuretech is to play an integral role in the development and influence of electrotechnology training on a national scale.

Within its first year of operation (2016), Futuretech achieved considerable success, training over 500 students. In 2017 this grew to 780 students, exceeding apprenticeship capacity for the year.

Feedback from the telecommunications industry led to Futuretech collaborating with Communications and Information Technology Training (CITT) and TITAB (an ACMA accredited cabler registry service) to develop VQRA and ASQA approved programs to train displaced workers in cabling endorsements. Over 100 qualifications have been awarded in Open Registration and Cabling programs since July 2016.

The success of Futuretech within a short time period demonstrates that it is a model worthy of replication. Its embedded videoconferencing and other sharing technologies facilitates easy transmission into other sites. Futuretech has been trademarked, with the ETU expressing interest in replicating the model in other locations using the Futuretech brand.

Principles for success

According to the partners in Futuretech their success is based on:

Unique Physical environment

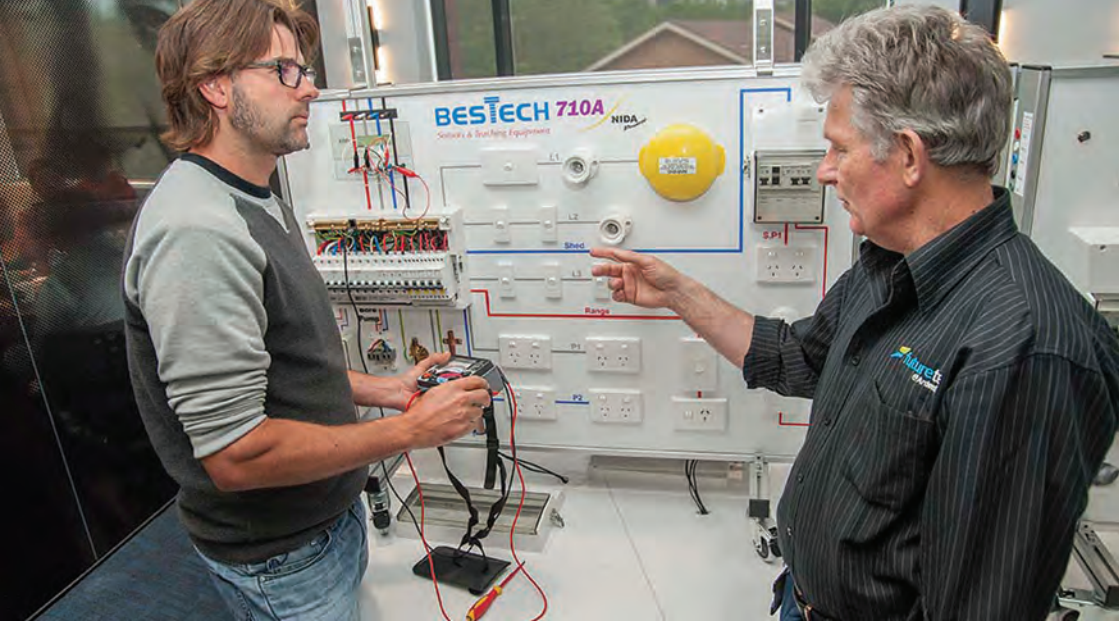
The Centre, equipped with state-of-the-art teaching equipment including computerised training boards which simulate domestic electrical layouts, sets the benchmark based upon world's best practice. High tech audio visual and conferencing equipment enables distance teaching and communication.

Learning from influential industry leaders

Industry presentations, group training company visits and access to valuable industry contacts and networks through the ETU, are embedded in all programs, offering exceptional opportunities to students not available through other providers. Futuretech actively seeks feedback and industry input into course design. Its collaboration with the NBN on course design led to the development of three new programs to meet NBN requirements to deliver skilled workers for the NBN rollout.

Superior Student Support Services

Students achieve training success through support from Holmesglen's comprehensive Student Services' resources. These include careers counselling, welfare information, referral, personal counselling, recreation and activities program and skill development workshops. A Graduate Employment Service assists graduates to find employment. Holmesglen's Apprenticeship Support Centre provides intensive case management services to successfully reduce attrition rates.



Outstanding Staff

Futuretech recruits the best staff with current knowledge from industry. A strong professional development program, including the National Electro Technology Conference, Skills Oz and EoZ Conference, ensures staff access current and emerging trends and technologies in industry.

Project Governance

The project is overseen by the Strategic Guidance Group (SGG) with executive representation from both parties and industry. It was formed to ensure a strong foundation for the collaboration followed by clear future strategy and organisation development. The SGG established responsibilities for risk management, performance management, communications and promotion.



Education model

A contemporary Learning Management System (LMS), Energyspace, developed collaboratively by the electrical Industry Skills Council with input by Holmesglen and industry, enables true competency-based progression mapped against the national qualifications. Allowing employers and students to access the system remotely to monitor student progress in real-time, industry has reacted favourably.

Skill assessment tools have been developed for on and off the job assessment, leading to their effective use through flexible arrangements for Futuretech and employers.

The LMS has changed student learning patterns, where all work was previously undertaken on campus, students now undertake knowledge development off campus completing skill development on campus.

The teachers at Futuretech are mentored and trained on progressive pedagogy methods such as delivery/learning strategies for team teaching and effectively facilitating flexible delivery and skill assessment.

Students undertake evaluation through surveys and feedback forms. The results are used to evaluate programs annually and to inform the areas of strength, improvement and emerging trends. The feedback received has been very positive, with 95% of participants rating the training as very high.

The only course that is delivered across more than one year is the Certificate III in Electrotechnology which in 2017 had a retention rate of 97%.

The Futuretech learning environment is designed to enhance professionalism, networking and career opportunities. The Business Lounge is used by existing workers, employers and entry level students for meetings, business and study requirements, creating an environment where they can engage and create mutually beneficial opportunities.

The design of the program and its allied employment outcomes are also designed to increase participation by under-represented groups in the community.

Futuretech is committed to reflecting diversity.

- As women in the electrical industry are greatly under-represented, the ETU has set minimum participation targets and established a Women's Committee that will develop a strategy to address the gender imbalance and provide a voice into the ETU.
- Adult apprentices who previously struggled to gain employment. Through self-directed e-learning, Futuretech is partnering with companies willing to take on adult apprentices. Employers realise that an adult apprentice with prior experiences learning within a self-directed learning program can achieve learning outcomes quicker, despite their higher salaries. Their off the job training can be completed earlier with more time on the job, generating income for the employer and mitigating the additional expense of adult salaries.
- Disengaged Youth. Futuretech has invested in building a relationship and pathway options for disadvantaged or disengaged youth. Each year the ETU contributes \$25,000 to North Melbourne Football Club's Huddle, a program which tackles youth disengagement. The benefit of this association is that it not only provides pathways to an electrical career, but opens up study options in all of Holmesglen's courses. The median age of students from 2016 to 2017 decreased from 22 to 19 years in Cert II and III programs – meeting the objective of attracting young people into the industry.



RMIT and Apple: digital skills for the 21st century

The Internet of Things (IoT) is transforming our engagement with everyday tasks and objects. In 2008, there were already more things connected to the Internet than people. By 2020, research predictions indicate that the amount of Internet-connected things will reach 50 billion, with \$19 trillion in profits and cost savings coming from IoT over the next decade.

Virtual and Augmented Reality are seeing data cross the frontier into the physical world. It is predicted that 500 million Virtual Reality headsets will be sold by 2025 and there will be 2 billion smart connected products enabling Augmented Reality by 2020.

By 2020, it's estimated that 90% of cars will be connected to the Internet as compared to 10% in 2012. The drone industry could be worth \$127 billion by 2020¹.

The reality of change is undeniable.

¹Source: Gartner Predicts 2017, Link Labs IOT, Dronelife.com

What is also undeniable is that more Australians are gaining qualifications than ever before, but the challenge is to ensure that they are focusing in the right areas. Overwhelmingly, a focus on digital skills is high on the list of required knowledge and skills. Increasingly this means industry credentials, not just formal education.

Those facts were the impetus for an Australian-first collaboration; RMIT University is working with Apple to deliver its App Development with SWIFT curriculum. SWIFT is the coding language used to develop apps for Apple's operating system, iOS, and is based on the premise that everyone can code.

Apple has 90 partnerships around SWIFT across the world and they are looking for more.

RMIT Vice-Chancellor and President, Martin Bean CBE, said: "These are the sort of skills Australians need for the jobs of the future and we're delighted to work with Apple as the first university in Australia to deliver tailored, industry-focused courses using SWIFT curriculum."

The growing app economy is an important source of employment contributing to economic growth in Australia, currently with an estimated 113,000 jobs.

The demand for digital skills in Australia continues to expand and by 2022, the nation will need an extra 81,000 specialist tech workers. The broader ICT workforce (those who are intensive users of technology in their work) is predicted to increase by 236,700 jobs.

The Apple vision aligns with the RMIT Online vision: *Community of lifelong learners successfully navigating the world of work*. The focus is to deliver learners a new life path and learning journey activated through a review, reskill, reinvent model.

The model is aimed at lifelong learners who need support throughout their careers, as opposed to a single focus on the young school leaver. The intent is to provide efficient and effective options for learners to develop and extend the skills and knowledge that will support them in their transition into new and emerging careers.

Transferable skills are also essential for future employment; any singular focus on hard, technical skills must be qualified by the soft skills that underpin successful employment in every industry. Courses offered by RMIT Online including the SWIFT program options also pay attention to this dimension.

The introduction of the SWIFT online programs has strong support from RMIT's industry partners.

Helen Souness, CEO of RMIT Online, said the new iOS App Development with Swift online program was co-created and endorsed by major industry partners, including Accenture, Tigerspike, jtribe and Bilue, who represented key drivers of growth in the app economy.

In a clear display of the appeal of the SWIFT program, 100 learners enrolled in the first course intake. It sold out in 24 hours. There have been 4 intakes now with a mix of Australian and international learners. The progression across courses in the sequence is 84 – 93%.

Some learners say they want professional development, others are looking for specific job outcomes. RMIT's employer partners want to employ the graduates.



Principles for success

- Partnership with organisations that can be part of a development, implementation and outcomes process for the learner. Apple's product and support for RMIT in the delivery of the program matched by the support of employers for the course delivery and its graduates have produced a rewarding pathway for lifelong learners.
- The focus of the SWIFT courses is on the skills that are needed in industry now and into the future. The courses deliver industry credentials based on a sound learning process that includes knowledge and skills. The industry outcomes can also be mapped to formal education outcomes.
- The pathway of skills development are aimed at both technicians and entrepreneurs.
- The courses can be accessed through several options with student support aligned to the delivery methodology.
- With the support of industry partners, there are job outcomes.

Education model

The SWIFT set of courses has been designed by Apple engineers and educators to teach coding and app design to students of all levels and backgrounds. They have been offered as a vocational short course on campus at RMIT from February 2018. In November, the same courses were offered through RMIT Online. The flexibility of the delivery options will remain a feature of the courses.

Through the RMIT Online offering, students can achieve an RMIT credential, which is a recognition of their skill development based on a rigorous project-based assessment that sits outside of the formal AQF framework. Students also have an articulation pathway to achieve credit points toward computer science or IT undergraduate degrees at the University. The RMIT credential is awarded in the form of a digital badge, endorsed by the courses' industry partners. Apple are also in the process of developing a Swift certification.

Each course is practical and designed to develop in-demand skills. It is project and milestone based. Learners are part of a learning community; they engage with their peers and receive expert feedback from their industry guides and teachers. They are never isolated or alone in the mix of independent and learning community activities. Industry supporters provide feedback and direction for the courses.

RMIT has awarded 100 scholarships for school teachers to enable them to upskill by completing the RMIT Online program, as well as a free summer coding school at RMIT's city campus where high school students will be able to learn the basics of coding in Swift.

Not all learners want to develop apps; RMIT's challenge with their industry partners is to design and deliver the technology and coding courses that prepare learners for the emerging requirements of the industry. RMIT Online has introduced new courses using the same methodology, now with 20 courses built with industry focused on emerging and in-demand skills across business, design and technology, including Blockchain, Artificial intelligence, customer experience and digital marketing.



Wodonga TAFE and ADF: Defence Medics Partnership

When working in an industry setting, TAFE teaching and support staff realise that accommodating the established practices and expectations of the partner's workplace is part of their role. For Wodonga TAFE staff working at the Army School of Health to deliver 2 health qualifications, the requirements are rather more wide ranging than in many other workplaces.

Working within a Defence Force location and sharing a workspace with Defence trainers and administrative staff requires that Wodonga TAFE teachers know about and adhere to strict security protocols as well as discipline procedures and chain of command practices. The longevity of the partnership and the successful outcomes for learners would indicate that Wodonga TAFE teachers can manage the specialised workplace conditions.

Wodonga TAFE, in partnership with the Army School of Health at Latchford Barracks, has been delivering the Australian Defence Force Medic Course (ADFMC) training onsite since 2012. It is one of four contracts that Wodonga TAFE has with the Australian Defence Force. As a tri-service contract, the learners in the ADFMC are currently serving in one of three ADF services: Army, Navy, or Air Force. It is a unique training environment where learners qualify as a health professional whilst also meeting the requirements of military training.

Principles for success

As partners in the undertaking, Wodonga TAFE and the Army School of Health are connected not simply by a contract but also by a shared vision of the highest quality of training outcomes for those enrolled in the qualifications and for the armed services, in general.

According to the Wodonga TAFE project manager, two of the three fundamental principles of the success of the partnership are the delivery of the education services and an active approach to the maintenance and management of the relationship. His third fundamental principle for success is contract administration which is closely tied to both service delivery and relationship management. Unlike many other industry projects, he has an active role in monitoring and managing all three; a critical success factor in the partnership providing clear and open communication across operations and management levels and a consistent approach across all aspects of the project.

To promote the clear and open communication that leads to high quality and consistent training and skills development, the ADMFC partners have developed a series of formal meetings to address the status of the education service delivery. These communication channels provide the conduit for the implementation of a communication strategy that is based on collaboration, shared vision and common goals. They operate across contract management, educational governance and student progress parameters. As ADF staff are likely to be redeployed every two years, the formal schedule for and purpose of the meetings acts to maintain the critical working relationships.

The ledger of meetings includes contract management, leadership teams from each partner to discuss course development and planning, Defence and Wodonga TAFE co-ordinators meet to discuss student progress and any student management issues and team meetings for Wodonga teaching staff with their Institute co-ordinators.

The success of the partnership is demonstrated by its longevity and the qualifications awarded to twenty groups since its inception in 2012, including:

- 391 qualifications in Certificate III in Sterilisation and Certificate III in Pathology
- 574 qualifications in Diploma of Nursing
- 577 qualifications in Diploma of Paramedics



Education model

The ADF Medic Course provides training that will meet the military requirements in both in-patient and pre-hospital environments and also receive nationally recognised health practitioner training. Delivering high quality training outcomes therefore includes three dimensions for the Nursing and Paramedic courses: addressing Defence Force requirements, VET quality requirements and professional accreditation requirements. The Defence Force and the Wodonga TAFE teams have responded by designing a learning program that delivers on all requirements and expectations and is continually reviewed, evaluated and improved.

From the perspective of the delivery of a top quality educational service, the course content is contextualised for the specific operational requirements of the medic role. The 'civilian' qualification is adjusted and re-organised to develop a capable military medic with particular attention to the similar and different needs of the three services. The graduates have to be job ready as they can be quickly deployed for action in Australia or overseas placements.

The ADF provide a training facility of exceptional quality. Along with full simulation of a battle environment complete with simulated monsoonal rain, bomb explosions and gunfire, it offers doors and wall sections that can be set up to replicate submarine or ship settings. This facility provides students with the ideal environment to develop and implement the required skills in the most realistic settings. Both partners are committed to maintaining and continually upgrading the facilities.

The programs are intensive; full time five days a week over 18 months (including military modules) for Nursing and Paramedic qualifications. Wodonga TAFE provides onsite teaching staff who are fully inducted into worksite requirements, a study skills centre and an after-hours onsite tutor. Students at Latchford Barracks are part of Wodonga's student network via a wireless LAN supporting blended learning and providing access to extensive learning materials and support applications.

The placement requirements of the qualifications are managed locally, regionally and across Australia using Wodonga TAFE and Defence Force contacts, underpinned by the strength and durability of the partnership. In addition, local and regional government and social support agencies are engaged to contribute to learners' understanding and experience of the civilian dimension of each course.

The partnership model works on a local and operational level as well as in the management context. As the chain of command is central to the management of Defence organisational delegation, and therefore for the success of the program, Wodonga TAFE staff ensure that they are using the required and proper communication channels to address any of the decisions and issues that may arise.

The regular discussion of timetabling, placement and assessment requirements with the relevant platoon staff assists students in managing what can become the competing priorities of their study and military commitments. Individualised student support and management also benefit from regular and focussed communication across teaching and platoon staff.



SuniTAFE: Harvesting Productive Relationships

SuniTAFE's area of influence is around 17% of the Victorian landscape covering the Shires of Buloke and Gannawarra and the Rural Cities of Mildura and Swan Hill. In 2016, SuniTAFE made a strategic decision to focus on growing SuniTAFE's share of the training market in and for the region in which it operates. To realise this strategy, SuniTAFE has worked to understand and respond to the needs of its local industry and ensure that it delivers courses to match those needs. The decision was to concentrate on the local market, local student outcomes, be more aligned with known and anticipated employment growth areas and to be responsive to regional industry demands.

In 2017, providing further advice and direction for the Institute, the Regional Skills Demand Profile for the Mallee Region led by the Victorian Skills Commissioner, recommended a closer alignment of the VET system with the current and future demand of industry in the region.

The region is a major food producer, with grain, fruit and wine grapes being the predominant industry outputs. Growth in non-food industries is however increasing, with mineral sands emerging as a significant industry and renewable

energy gaining importance. The region is positioning itself to be the centre of Australia's solar industry through facilities near Mildura, Swan Hill and Kerang. These environmental factors have largely influenced the development of SuniTAFE's decision-making in respect to its course offerings.

Principles for success

When matched with an ageing population and workforce, and the challenge of distance between population and industry centres, SuniTAFE has responded with a strategic focus on:

- An increase in delivery to address areas of regional skills shortage – Health Care and Social Assistance, Trades, Transport and Horticulture/Agriculture.
- Staff professional development plans that incorporate an increased focus on industry collaboration and ensuring staff are current with the most up-to-date technical knowledge in their field.
- Development of key partnerships with industry sectors to promote training and skills and also to promote economic development within the rural/regional footprint.
- Adoption of education design and engagement models that take training to individual employers, wherever possible.
- Support for employer and potential employees through the Skills and Jobs Centre.

The advice of the Skills Commissioner was summarised in his message to the Institute as 'Partner Up'.

SuniTAFE is heeding the advice, becoming more agile in identifying and meeting the needs of target industries. We consider ourselves as being 'open for businesses', designing new training products to replace off the shelf versions and seeking and responding to industry feedback and requests.

As a direct result of industry feedback, SuniTAFE has developed a Horticultural Cadetship model. This model will allow 40 young people with aspirations of starting a career in Horticulture to enter into an extended training program. Industry has played a key part in designing the qualification which include new and emerging technologies.

The new approach has been met with an improvement in learner numbers, for example, Horticultural enrolments have increased from 15 students to 320 in 18 months.

Education models

The following industry partnerships demonstrate that SuniTAFE has acted on the advice of the Skills Commissioner. The Institute has 'partnered up' and focused on the strengths and the employment needs of its region.

In general terms, all industry students have individual learning plans. The context of the learning is led and informed by industry; SuniTAFE is responsible for educational governance, compliance and the calculated risk of each training contract.

Agromillora Australia

SuniTAFE and Agromillora Australia, as part of an international group based in Spain, signed a five year Memorandum of Understanding in 2016 for the planting of super high-density olives and almonds at the SuniTAFE Training Farm at Cardross. Hedgerow planting of these crops is new to Australia, and the SuniTAFE farm forms an important trial plot to introduce and showcase the practice. The MoU allows both SuniTAFE and Agromillora to showcase the plantings to their respective industry partners. SuniTAFE will also use the plantings and the results/research from the plantings in its student curriculum, exposing SuniTAFE students to the newest horticulture methods and technology, preparing them well for their future careers. Agromillora can provide industry with access to this world best horticultural practice plantings.

Assistance from the Victorian Government through the Regional Jobs Fund has meant that Agromillora Australia has spent \$3 million revamping its existing Irymple site near Mildura in North-West Victoria, building a new laboratory, manufacturing facility and shade houses, and creating 20 new jobs along the way. Commenced in 2015 and completed in 2017, the facility can grow four million almond trees annually, helping alleviate the almond tree supply shortage to South-East Australia's horticultural industry. The business now has the ability to scale-up production to meet demand in wine, dried fruit, citrus, avocado, olives, stone fruits, berries and almonds in line with industry demand.

SuniTAFE has had a long association with Boulevard/Agromillora Nursery with the organisation providing work placement for Horticultural students over a number of years. Agromillora have also used the work placements as an opportunity to recruit key staff for their organisation.

SuniTAFE, through the operations of its Skills and Job Centre, had discussions during the second half of 2017 and into the early part of 2018 regarding the skills needs of Agromillora during this period of expansion for its existing and new staff. SuniTAFE, in consultation with Agromillora, developed a career pathway plan for their organisation.

The results of this and further discussions identified that whilst Agromillora's current staff are performing their roles to a satisfactory level, there is a real absence of nursery specific skills.

As a result of this consultative process, training has been agreed to by Agromillora in AHC31116 Certificate III in Production Nursery. Agromillora has indicated that 11 existing staff and a number of new staff will be enrolled into this qualification. SuniTAFE has employed a suitably qualified teacher into its teaching ranks, and the employment of this teacher will allow this opportunity to realise its full potential.





All abilities program: Christie Centre

SuniTAFE has worked with the Christie Centre for three years delivering Certificate I in Horticulture. As a major local provider of support services for people with disability and complex support needs, the Christie Centre is a significant cog in the Institute's connection to community and industry. Industry partner Agromillora has recently employed several Christie Centre clients who have completed the Horticulture program.

In addition, SuniTAFE plans for a significant number of its training staff to enrol in Certificate IV in Disability to cement the partnership and provide specialist support in both community and training contexts.

Select Harvests

Select Harvests is one of Australia's largest almond growers and the country's leading manufacturer of nut products. The training of Select Harvests' employees has been in operation for five years but the approach has recently been modified. Structured meetings between the two organisations take place every two months to review progress, ensure training maintains relevance and to introduce change in real time for the benefit of the current learner. Students were enrolled onsite at Select Harvests in courses that include; Irrigation, Leadership and Management, Rural Operations and Automotive. Where required, specialist VET trainers are sourced and, in some cases, flown in to conduct training at the worksite. The training model emphasises the connection between the endorsed learning outcomes and the reality of the employment requirements.



Swinburne, AiG and Siemens: Industry 4.0 Higher Apprenticeship Partnership Project.

Swinburne's 2025 vision of social and economic impact through science, technology and innovation is realised in the Industry 4.0 project which aims to ensure that their programs remain relevant and respond to the known and anticipated impacts of disruptive technologies. Investment is focused on programs, people and partnerships.

Industry 4.0 is the fourth industrial revolution, bringing together computing, automation, robotics and machine learning into cyber-physical systems. Machines talk to machines using computers and manufacturing moves from a batch approach to individual outputs. Industry 4.0 aims to see significant production and efficiency dividends and to ultimately deliver improvements in the quality of life and environmental outcomes.

As a dual sector institute, Swinburne works to ensure that they can leverage the advantage of being a university for the benefit of industry, employers and learners in the development and delivery of new and targeted courses.

Swinburne is investing in new technologies to build workforce capacity and the job readiness of graduates through the Applied Technologies Lab, Industry 4.0 test lab, and digitising of the Advanced Manufacturing Design Centre. They have also launched a new research centre – The Centre for the New Work Force. This applied research centre is embedded in vocational education program development and delivery and is primarily a resource to industry. Through the Centre, Swinburne aims to prepare new and existing workforces for the fourth industrial revolution.

The Higher Apprentice qualification, an Australian first in Industry 4.0, was developed through consultation with targeted industries in Australia and Germany, including the Federal Government, the Australian Industry Group and Siemens. The development of the program commenced in October 2016, with approval and international validation received in January 2017. Delivery commenced in February 2017.

Initially developed as a pilot, industry demand has necessitated a second cohort outside of the pilot process. All initial apprentices will be retained by project partner, Siemens.

The project was challenged across three dimensions:

- A focus on emerging international industry needs.
- The development of an education model that met the needs of industry and of learners.
- The negotiation of existing university and VET delivery and accreditation requirements.

The range of new initiatives and collaborations that have grown from the industry partnership, including interstate industry collaborations, is enabling Swinburne to challenge existing funding models and allocations with industry support.

Principles for success

- A focus on building programs, partnerships, people, property, profitability.
- Leveraging and connecting the University's research, higher education and vocational education capabilities.
- A focus for development that is external – industry led and not just demand driven.
- Significant investment in staff capabilities, technical infrastructure and delivery of the program using agile methodologies including student feedback.
- Complementary project roles based on expertise and stakeholder connections:

Australian Industry Group

- Project lead
- Promoting with industry and government
- Negotiation with relevant stakeholders in development of policy

Siemens Australia

- Expertise in Industry 4.0
- Linking Swinburne internationally for content of curriculum; Siemens Academy Germany, Stuttgart University, Festo and others
- Employer of higher apprentices; 20 in first year, 7 in second year

Swinburne

- Negotiation with industry stakeholders for curriculum design and the employment of higher apprentices
- Accreditation of curriculum
- Associated research and innovation in Industry 4.0
- Ongoing development of new curriculum and streams such as construction technologies including BIM, energy, cyber security and other emerging areas impacted by digitalisation



Education model

The program focuses on the essential skills required of the future workforce in digitised advanced manufacturing environments. It focuses on end to end digitalisation. Designed as an engineering 'higher apprenticeship' program, topics include the machine to machine communication of the Internet of Things, advanced manufacturing processes, automation and robotics, cloud computing, advanced algorithms, smart sensors and cyber physical systems.

A critical aspect of the education model related to the negotiation of entry requirements for students. Given the industry focus of the program, it was agreed that entry criteria would be based on industry processes and requirements rather than academic hurdles. Therefore student recruitment would be undertaken largely by industry partners in consultation with Swinburne.

The education model included attention to:

- Close communication about the pilot program.
- Review and evaluation components in design and delivery phases.
- Block delivery of the program for 37.5 hrs per week as in a workplace.
- Study Abroad component; students visit industry sites in Germany and the Hanover Fair. Preparing graduates to be change agents and practical leaders meant their exposure to and knowledge of industry trends has to be genuinely world leading.
- Parallel development of an Associate degree and a VET diploma for entry level work preparedness and building capability for the industry outside of Swinburne's own operations.
- Meeting the requirements of University and State program accreditation processes with linked frameworks and timelines.

To support the project and embed the education outcomes in education practice, Swinburne has developed and accredited an Associate Degree in Applied Technologies. Its development has included:

- Negotiation with industry stakeholders for the design of the curriculum and the employment of higher apprentices.
- Associated research and innovation in Industry 4.0 concepts, frameworks and practice.
- Ongoing development of new curriculum and new streams such as construction technologies including Building Information Modelling, energy, cyber security and other emerging areas impacted by digitalisation.
- The development of a linked VET diploma and planning for a 3rd year of a bachelor degree.

The program was conceived and developed within an aggressive timeline that challenged all University and State program accreditation processes, and usual project implementation expectations. Added to that hurdle was a perceived conflict with the demand driven model of student recruitment; the graduates are being developed for jobs that (largely) don't yet exist.

The developmental nature of the project and the courses was recognised and explicitly addressed by embedding constant and measured review and refinement protocols. Technical expertise and teaching expertise have at times been conflicted, but the conflict has been managed.

New initiatives and collaborations have grown from the engagement of the partners, including additional interstate industry alliances. New insights have informed other program development with a new digital overlay to every program.



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