

University Sector Review Panel Discussion Paper  
(Western Australia)  
Engineers Australia's Submission  
May 2023



ENGINEERS  
AUSTRALIA

## Engineers Australia response to the University Sector Review Panel Discussion Paper (Western Australia)

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# Introduction

## About Engineers Australia

Engineers Australia is the peak body for the engineering profession in Australia, constituted by Royal Charter to advance the science and practice of engineering for the benefit of the community. With over 115,000 members nationally we represent a profession that impacts the lives of Australians every day.

As Australia's signatory to the International Engineering Alliance, Engineers Australia maintains national professional standards, benchmarked against international norms. Engineers Australia was a founding member of the Washington Accord 1989. The Accord is a multi-lateral agreement to recognise the substantial equivalence of AQF 8/9 engineering qualifications as the agreed education base for the profession and facilitates international mobility. Engineers Australia is also a signatory of the Sydney and Dublin Accords, which recognise 3-year (AQF 7) and 2-year (AQF 6) engineering qualifications.

Under the Migration Regulations 1994, we are the designated authority to perform the assessment of potential migrant engineering professionals' skills, qualifications, and work experience to ensure they meet the occupational standards needed for employment in Australia.

## Contact

If you wish to discuss any of the points raised in this submission further, please contact Engineers Australia by email [wa@engineersaustralia.org.au](mailto:wa@engineersaustralia.org.au)

# Response to discussion paper questions

## University Sector Review Panel Discussion Paper

Engineers Australia believes there is an opportunity through this review to achieve enhanced cooperation as we see significant benefits can be achieved through increased collaborations between university and industry.

As outlined in our responses below, Engineers Australia sees that any structural change should lead to a broader understanding of the value that higher education brings to the individual, their community and society.

Structural change that encourages and supports greater collaboration with industry should aim to lead to greater relevance and meaning in curriculum and assessment design, diverse working integrated learning (WIL) experiences embedded across a degree, opportunities for improved student engagement and motivation (for example through formal Students as Partners processes), and extended professional networks, which in the case of engineering can be facilitated by Engineers Australia.

Our responses to specific questions are provided as follows.

**Question 2. Is there a structural option category, within the framework shown at Table 2 or additional to it, that is likely to deliver improved performance and sustainability of Western Australia's public university sector? What are the relative merits of it?**

Engineers Australia favours the 'cooperation' structural option category as we see there are significant benefits that can be achieved through increased collaborations between university and industry. The closer universities are to industry the more likely it is that there will be a greater understanding of the gaps in the workforce and the environment graduates need to be prepared for. Work integrated learning programs and higher (degree) apprenticeships afford the highest level of authentic learning.

Sharing or disseminating good practice is necessary, but insufficient in a cooperation model. Good practice needs to be adopted and adapted at the local level. Professional bodies, such as Engineers Australia, can be a critical conduit between universities and industry, which can reduce the need for individual industry to university relationships that can be limiting for small to medium industry partners.

**Question 4. What data sources should the Panel consider as it seeks to examine the relative merits of various structural options?**

As well as the higher education statistics provided by the Australian Government Department of Education (previously uCube), the [Australian Council of Engineering Deans](#) regularly report on engineering education statistics. These statistics are not only for WA, but they do provide some comparative analyses. Engineers Australia will soon be launching a portal into the Census data as it pertains to engineering. Detailed data related to engineering can be accessed through this portal.

**Question 5. How could structural change in the Western Australian public university sector enhance domestic and overseas student enrolments?**

Engineers Australia sees that any structural change should lead to a broader understanding of the value that higher education brings to the individual, their community and society. If there is a lack of awareness of the opportunities that different professions (or higher education) provide, then there will continue to

be a challenge to attract both domestic and international student enrolments. Raising the awareness of opportunities goes hand in hand with developing alternative pathways into tertiary education. The agility to focus on areas where there are critical skill shortages that are likely to continue for some time, such as engineering, will bring greater benefit to the community and reinforce the link between community, critical industries and the university sector.

Engineers Australia strongly supports initiatives that increase diversity, reduce barriers to accessing higher education and increase completion and employment rates at the local (institutional) level in the engineering sector. Increasing female participation rates to be on par with their male counterparts in engineering will increase enrolment numbers considerably. Engineers Australia is keen to work with the WA university sector to identify those initiatives that will lead to increasing the diversity of the student population, as a whole, but specifically for engineering. An example of such an initiative is a collaborative model where higher-apprenticeships that target diversity are developed collectively by government, industry and higher education who work in partnership with the individual learner. This can be resource intensive if done in an ad-hoc fashion, but a centralised function can lead to efficiencies that make the implementation at scale more feasible.

For international students to see Western Australia as a destination of choice, the reputation for graduate outcomes will need to meet international standards. Many international institutions now incorporate the United Nations Sustainable Development Goals (SDGs) as part of the graduate outcomes that students need to achieve. The concept of Students as Partners is growing as a means of enabling students to fully engage not only with their university, but with other universities across the world, and develop a deeper understanding of the implications of the SDGs.

Recent research shows a large cohort of migrant engineers and international graduates from Australian higher education providers find it difficult to gain employment in the engineering profession in Australia. Providing quality support to international students and graduates will strengthen the local pipeline of engineers with the added benefit of them having developed local experience.

Understanding the impact of online learning and its effect on verification of outcomes is critical. Currently, standard eight of the current National Code of Practice for Providers of Education and Training to Overseas Students 2018 allows only one-third of the course to be taken online by students on a student visa. Any changes to this aspect would need to be carefully considered, particularly for programs, such as engineering, which include practical/lab components providing students the opportunity to apply academic theory with practice. This helps to develop international students understanding of local standards and engineering know-how as well as English language skills.

While aspects of online learning are proven, challenges exist ensuring students gain the practical elements of their courses and local knowledge. Changes to the current framework need to consider the intangible benefits students gain from a face-to-face delivery method, including those stated above. Engineers Australia believes not all programs can be covered by the same approach and this should be considered as part of the review.

Integrated learning opportunities are an important part of an engineer's development. For a higher-education provider to have a professional engineering program accredited, they are required to provide opportunities for student engineers to engage with professional engineering practice. This can be through a range of work integrated learning opportunities (WIL), including placements. Providing greater flexibility for international students to engage with course related WIL programs (in and ex-curricula) in addition to the maximum hours of work permitted under their visa would make these programs more accessible. Engineers Australia recommends the Western Australian Government consider ways to support students and providers to assist in the development and implementation of programs which builds the skills sought after by employers, that are shorter and less expensive, than the limited courses currently available.

**Question 6. What type of structural change could help improve student access to course offerings for equity group students?**

Lack of universal accessibility to higher education is a critical limitation in the current approach. Overcoming this limitation requires a thorough redesign of the possible pathways into higher education. Improvements which best serve under-represented and disadvantaged students should be identified and prioritised; if they are supported then everyone (else) will be too. The structural change required to achieve greater accessibility could focus on opening up more than the traditional pathways for students to enter university. This could be achieved through formal partnerships with the school and Vet sectors as well as industry for mature-aged students who wish to retrain.

**Question 7. What are the barriers to Western Australian public universities providing access to regional and remote students? How could structural change help overcome these barriers?**

Alternate pathways to professions are emerging – the (traditional) pathway to being a professional engineer via a school leaver completing a full-time degree program may be complemented by programs with embedded experiential learning pathways (e.g. higher (degree) apprenticeship model).

**Question 8. To what extent could structural change enhance the student experience?**

Structural change that encourages and supports greater collaboration with industry should aim to lead to greater relevance and meaning in curriculum and assessment design, diverse working integrated learning (WIL) experiences embedded across a degree, opportunities for improved student engagement and motivation (for example through formal Students as Partners processes), and extended professional networks, which in the case of engineering can be facilitated by Engineers Australia.

Alternatives exist to the GPA assessment paradigm, which currently may not be serving students in the best way. It is becoming more widely recognised across the professions that the skills and knowledge required in the future workforce will require a life-long learning paradigm. The role of universities will necessarily need to adapt to ensure graduates are entering the labour market with the ability to **acquire** the skills and knowledge they need in a changing environment. Authentic learning and assessment, embedded in industry, is a model that shows potential for achieving the life-long learning mindset in graduates. Redesigning the learning and assessments required in the curriculum, by embedding industry in the education of students, is a structural change that will require considerable investment in human capital. An investment in centralised resources is required to obtain the efficiencies to make such a structural change viable.

ePassports, that include portfolio evidence of an individual's capabilities and competencies are foundational for life-long learning practices, identifying and tracking continuing professional development. Real-time aggregated data from this scheme could signal and afford greater confidence for universities to develop new programs and pathways.

Alignment to the National Credentials Platform coupled with universal and consistent language and metrics for measuring credit and Teaching & Learning activities across institutions may help lift performance. Higher education needs to be agile. Pathways between vocational education and training and higher education will need to adapt to emerging mechanisms that recognise microcredentials.

Such approaches would be most effective when implemented at a national level.

**Question 9. How could structural change realise opportunities for Western Australian public universities to become more competitive in attracting research funds while enhancing the profile of world-class research in Western Australia?**

The Commonwealth research funding model increasingly requires greater investment from industry in research and development (ie. The ARC linkage model).

**Question 10. How could structural change help position the Western Australian public university sector to attract and retain high-calibre staff?**

Increasing opportunities for industry-based engineering personnel to participate in engineering education would help to attract high-calibre engineers. These opportunities might be modelled on practices already implemented in the health and creative arts disciplines. Several education providers have implemented engineering practitioners as part of the staffing profile of Schools of Engineering. An example of this in engineering can be seen in the Engineers in Residence program at Charles Sturt University.

**Question 12. What are some current examples of large scale, long-term collaboration that demonstrate successful partnerships between public universities and other sectors (e.g. business, industry, VET or school)?**

[Innovation Central Perth \(ICP\)](#) is an industry and research collaboration centre located at Curtin University, with the vision of advancing digital transformation through an open innovation ecosystem. The centre is designed to nurture innovation and growth by solving business challenges through rapid solution prototyping.

Offering unique access to state-of-the-art facilities, the centre helps organisations scope projects by building a team around their challenges to identify, test, conduct comparative analysis and deploy innovative technology solutions using cloud computing, data analytics and IoT network platforms. ICP supports original and inventive solution development through concept testing, prototype development and integration analysis.

The centre brings together industry experts, Cisco engineers, university researchers, computational and data scientists, and a pool of student talent in an open environment to create ground-breaking and innovative solutions that foster growth, provide jobs and help build sustainable economies. Through these projects, ICP brings together the WA innovation ecosystem to connect and engage in a collaborative environment.

[The CEEDWA program](#) offers research projects for students sponsored by business, government and not-for-profit enterprises. The projects link industry with prospective graduates and the cutting-edge research programs of Western Australia's leading universities. In 2023 there are 20 active projects, and by the end of the year the program will have completed over 600 projects with over 90 businesses, government and not-for-profit partners.

From our experience in Western Australia, Engineers Australia believes these models have served the state well and would encourage the review consider how support can be provided to expand to other important stakeholders, particularly schools and the VET sector.

**Question 13. How could structural change strengthen Western Australian public universities' relationship with business, industry and VET providers to underpin a more cohesive tertiary sector?**

Engineers Australia advocates for increased tertiary sector and industry collaboration to identify and develop pathways programs that result in an increase in VET program participation and progression to degree qualification. This can be supported by whole-of-sector initiatives such as shared data and analysis to inform decisions by tertiary sector and industry, as well as epassports that record and support a whole-of-career pathway of learning and professional development.

Partnerships between universities and industry are fundamental to WIL opportunities. Through stronger partnerships we can ensure the learning experiences reflect the work being done in industry, helping to facilitate the transfer of theory to application. These partnerships need to move away from industry acting as a 'host' to students, to more of a collaborative and cooperative relationship. The Australian Collaborative Education Network (ACEN) National Strategy on Work Integrated Learning in University Education Strategy is premised on collaboration between educational institutions and industry partners and is a good example of a collaborative and cooperative relationship. The Strategy promotes WIL as a key strategy for improving graduate employability and ensuring the economic sustainability of Australia.



Engineers Australia recommends this strategy, and the [Engineering Internship Hub of Young Engineers Australia](#), be reviewed by the panel in their deliberations of what is required in a robust framework.

The structural change that is chosen should consider how groups hosted by professional bodies can be used to create a more cohesive tertiary sector. For example, there is a Professional Practice Advisory Group hosted by Engineers Australia in WA that brings together representatives from each of the public universities and industry (through invited Engineers Australia members) to share information and work on ways to enhance work experience for student engineers and their employers as a collective. This work is aimed at enriching the experience for all involved and the employability of the graduate.

**Question 14. How well are Western Australian public universities working with business and industry to meet the State's future labour market skill and knowledge requirements?**

Engineers Australia has links to all the Western Australian public universities offering engineering courses and specifically for those courses accredited by Engineers Australia. An important principle of the engineering accreditation process is to evaluate the relevant industry needs and assess whether graduates have attained sufficient skills and knowledge at the entry to practice level. Entry to practice is a concept that could be better understood by industry as the graduate cannot be expected to have obtained all the necessary knowledge and skills over the course of their degree.

An important outcome of engineering education, or any education, should be that the student **learns how to learn** in their specific field of study. Industry's role in the further education journey of their employee, particularly graduate formation, requires an agreed, and likely evolving, definition of the State's future labour market skill and knowledge requirements.

Most higher education programs develop the basic skills required of any graduate in the workplace (critical thinking, communication, problem solving, collaboration, research and analysis, ethical and social responsibility) and additional technical and practical skills in the field of study would also be developed. These base skills mirror the UN's Sustainable Development Goals (SDGs). As Australia has committed to advance these, aligning graduate attributes attained through higher education with the SDGs may provide a mechanism for collecting data to further inform how Western Australia is addressing the SDGs. These data could then feed into the Australian Government's Reporting Platform on the SDG Indicators as a means of measuring the success of WA meeting future labour market skill and knowledge requirements.

Engineers Australia is of the view there are a number of avenues being used currently by the universities to work more closely with business and industry to meet the State's future labour market skill and knowledge requirements.

However, this is not consistent across the universities and there are opportunities to improve the level and quality of engagement through formal and informal means.

Engineers Australia engages with the universities through the WA Division General Manager and student client manager and facilitates member and volunteer involvement in a number of ways that assist to inform future labour market skill and knowledge requirements.

The Engineers Australia WA GM sits on various Industry Advisory groups at the request of the University. These advisory groups also include Engineers Australia members, engineering and other related professionals and industry representatives who provide advice on industry trends and advances, current and future skill requirements as part of ongoing workforce needs.

Engineers Australia regularly provides information to the Engineering Deans and academic staff and the industry advisory groups such as the [Australian Engineering Employment Vacancies Report \(engineersaustralia.org.au\)](#) and Strengthening the Engineering Workforce (see Additional Information).

Engineers Australia regularly invites Engineering Deans and academic staff to our continuing professional development sessions and networking events to provide them with the opportunity to engage with industry. Those that are Engineers Australia members (and we encourage them to become members) have ready access to our offerings which inform future labour market skill and knowledge requirements.

**Question 15. What are your overall thoughts on the options for structural change that would provide the best outcomes for:**

- (a) the Western Australian university sector (for students and staff, research, financial sustainability and rankings)?**

The optimal structural change will need to be built on a fundamental understanding of the radical changes likely in the future of work. The Australian Council of Professions conducted a [round table on the future of working](#) in December 2022 that provides food for thought for the future of education, canvassing aspects of culture, time spent at work, diversity in the workplace and digital literacy skills all graduates will require in the future.

Through their accreditation processes, Engineers Australia plays an integral role in the education of engineers through both the VET and higher education sectors. Engineers Australia is part of the Australian Council of Engineering Deans and the Associate Deans Learning and Teaching and actively participates in their meetings and forums. The Australasian Association for Engineering Education is a technical society of Engineers Australia; a society committed to advancing engineering education. Collectively, this engineering education community has undertaken a considerable body of work over recent years on what the engineer of the future will look like. The [Engineering Futures 2035 project](#) includes a number of reports that can inform some of the futures thinking required to develop the optimal structural reform.

Anecdotal evidence suggest that students often articulate a problem understanding the difference between the content they learn and its subsequent application once they graduate. This is not a new problem, but one that requires attention in any structural reform. Instilling the life-long learning paradigm in both the student and industry should underpin the structural changes to address this gap.

**Question 16. Are there any other matters of which the Panel should be are as part of its Review?**

1. Alignment with the Universities Accord reform that is going on at the National level needs to be given careful consideration in this review.
2. The current grouping of universities into Go8, ATN, IRU, RUN (could be considered in the context of whether they provide a barrier or an enhancement for the universities who are group.
3. Professional bodies provide critical links between business and universities, particularly when they have a role in setting the threshold standards of competency for the profession. Engineers Australia sets the standards for practice at three levels: entry to practice, chartered (5+ years experience) and at the executive/leadership level. These standards are aligned to international thresholds through Engineers Australia being signatories to the Washington, Sydney and Dublin Accords for the levels of Professional Engineer, Engineering Technologist and Engineering Associate, respectively. The application of these, and similar professional standards, should have an ongoing role in setting (and evaluating) relevant skills, capabilities and competency standards required by industry. Internationally recognised accreditation also affords internationally mobility for graduates.
4. Further additional information is provided in the following pages.


## Additional Information

Engineers Australia draw the panel's attention to the following reports relevant to the future engineering workforce and skills:


- Engineers Australia [Strengthening the engineering workforce in Australia – report August 2022](#)
- Engineers Australia [Women in Engineering – report June 2022](#)
- Engineers Australia [Barriers to employment for migrant engineers – report October 2021](#)
- Australian Council of Engineering Deans [Engineering Futures 2035 - 2021 Engineering Change - The future of engineering education in Australia – report May 2021](#)

# About Engineering in Australia



There are **545,000** engineers in Australia with about **80%** in the labour force.



**243,000** of these engineers work in engineering occupations (56%).




An increase of **115,000** engineers since the 2016 census.


Year	Number of Engineers
2016	~430,000
2023	545,000

Australia has qualified engineers from every nation on earth.




60% Overseas Born  
40% Australian Born

There are over **87,000** women engineers in Australia, of these around **75%** were born overseas.



**STEM**



Mathematics  
2003

Science  
2012

2023


The OECD reports Australian students' performance in mathematics has been declining since 2003 and our performance in science has been declining since 2012.

2014

2023

Higher education commencements in engineering study in Australia, for domestic students, has been declining since 2014.


STEM occupations




12%

Science, technology, engineering and mathematics occupations are predicted to increase by more than **12%** over the coming years.

Increasing take-up of **STEM** subjects and building awareness of engineering is critical to boosting domestic supply.



**ENGINEERING**





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