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6 April 2018

Select Committee on the Future of Work and Workers  
Department of the Senate  
PO Box 6100  
Parliament House  
Canberra ACT 2600

**ACS submission to the Select Committee on the Future of Work and Workers**

Dear committee members,

Thank you for the opportunity for the Australian Computer Society (ACS) to provide a submission to the Select Committee on the Future of Work and Workers. ACS is the largest professional body in Australia that represents the ICT sector, with 30,000 active members who work in business, education, government and the community.

In preparation of this submission ACS drew upon its expertise and resources, including a range of ACS research publications and our Technical Advisory Board and Profession Advisory Board, whose membership is made up of leading Australian ICT, academic and industry experts.

We have summarised the feedback that directly relates to the key themes and questions in the Committee's terms of reference, most especially in the field of skills development. We believe that our submission will assist your government in its aims to develop a plan for the Future of Work.

If ACS can be of any further assistance please don't hesitate to contact our Director of Corporate Affairs and Public Policy, Troy Steer

Yours sincerely,

Andrew Johnson

Chief Executive Officer



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## About the ACS

The Australian Computer Society (ACS) is the professional association for Australia’s Information and Communication Technology (ICT) sector. The ACS has over 30,000 members and a presence in every state and territory of Australia.

ACS’ vision is for a vibrant digitally-driven Australia with a capacity to create and commercialise innovative ICT products and services for the world market, as well as being effective users of technology to maximise productivity and quality of life for all Australians. To achieve this, ACS has defined a three-pronged strategy of:

- Building Capacity to ensure that we have sufficient technology professionals to meet our economic growth needs by encouraging more people into ICT and STEM-related careers and attracting top talent from around the world.
- Developing Capability by developing superior skills and expertise in our people, establishing benchmarks, providing education, and identifying areas for focused attention which represent significant opportunity.
- Acting as a Catalyst to spark innovation and encourage both public and private sector organisations to embrace technology to transform processes and reimagine customer experiences.

ACS has been at the forefront of research into the future of work and the skill needs of a transitioning Australian economy in order to maintain our historically high standards of living. Relevant works that we have been involved with include:

- Australia's Digital Pulse 2015; Key challenges for our nation – digital skills, jobs and education
- Australia’s Digital Pulse 2016; Developing the digital workforce to drive growth in the future
- Australia’s Digital Pulse 2017; Policy priorities to fuel Australia's digital workforce boom
- Tomorrow’s Digitally Enabled Workforce
- Crossroads: An action plan to develop vibrant tech startup ecosystems in Australia



## Introduction

In the last five years there has been an explosion of interest in the subject of digital disruption and the future of work. This interest has been driven by the development of new technologies in the fields of artificial intelligence, automation and device connectivity.

A future without work has started to look less like the realm of science fiction and more like a fait accompli. That future is still a long way off, but we're entering a transition phase where certain types of human labour, particularly manual labour, can be readily automated. Being called "the fourth industrial revolution" by some, this will substantially alter the structure of the labour force, demanding new skills and jobs even as old ones are eliminated.

As a peak professional body for ICT professionals, this transition is obviously of keen interest to the ACS. We believe in a proactive approach to developing a skills base that prepares Australians for a future driven by and integrating with technology across all levels of the workforce. We work with educational institutions and businesses to develop strategies for coping with the inevitable structural changes in the workforce, and we hope this submission is helpful in developing those strategies for government.

## The key trends

In 2016 the ACS worked with the CSIRO to develop a report called *Tomorrow's Digitally Enabled Workforce*<sup>1</sup>. That report identified six 'megatrends' that will work to reshape the workforce of tomorrow:

- 1. The exponential growth in device connectivity, automation and artificial intelligence technologies.** These new technologies have the power to dramatically reshape the workforce in Australia and around the world, both destroying and creating jobs as well as reshaping supply chains and business practices. According to Oxford University, up to 44% of jobs that exist today will be subject to computerisation in the near future<sup>2</sup>. The McKinsey Global Institute puts the number closer to 50% of current work activities that are technically automatable using current technology<sup>3</sup>.

The exponential growth in computing power, data storage and collection and device connectivity presents a potential problem: rapid transformations that result in significant issues with respect to the retraining and readjusting of the workforce. For example, once there is a legally accepted platform for driverless road vehicles, it's possible that the uptake will be rapid, potentially causing an employment shock as large numbers of drivers will be displaced quickly without time to reskill. As a result, we have to be proactive rather than reactive in our response to these changes.

In terms of the greatest risk areas, the McKinsey Global Institute has recently developed a list of the most and least vulnerable fields of work<sup>3</sup>. Looking at 750 job categories in the United States, McKinsey identified manufacturing and production, office support, food preparation and service, agricultural and mining, and transport and delivery as some of the most vulnerable job areas.



Technology professionals, care providers, educators, creatives, managers and engineers were all employment growth areas between now and 2030.

- 2. A rising bar on the minimum skills needed to enter the workforce.** The jobs most at risk from automation and artificial intelligence tend to require the lowest skill levels. Entry-level positions will require higher skill levels than they have previously, which has ramifications for the education system as well as adult training. Upper secondary education is becoming a prerequisite for entering the labour market and the number of jobs for highly skilled labour will have doubled in the period between 1991 and 2019<sup>4</sup>.

Science, technical, engineering and mathematics (STEM) skills are associated with 75% of the fastest growing industries and jobs, yet such skills are actually in decline amongst student populations.

- 3. A 'virtualised,' on-demand workforce.** Around the world there has been a significant growth in the 'gig' economy, an economy exemplified by the likes of Uber, Airbnb & Airtasker. Instead of the traditional model of full-time and part-time work, there has been an explosive growth in freelance and contract work. This is happening at all levels of work, from low-level employees to high-level executives.

This has very significant implications for employment in Australia, and issues of income security, superannuation and retirement, industrial relations and worker exploitation are likely to be major concerns as the gig economy grows.

What's more, thanks to new communications technologies national boundaries are becoming more porous with respect to employment, especially when it comes to knowledge workers. It's now often just as easy, and quite a bit cheaper, for an Australian company to employ an overseas programmer as it is to hire local talent, for example.

On top of that, income growth in Asia is associated with increased educational and skills levels, as well as growing competition for Australia's labour force. As the developing world closes the gap, and the world population grows, over a billion new online workers will join global labour markets. Unlike the industrial revolution, where geography limited the flows of products and labour, the information revolution has no geographical barriers.

- 4. The era of the entrepreneur.** Following from point three, there is a trend to greater entrepreneurship among the next generation of workers. For new entrants to the workforce, there may not be jobs awaiting them at larger organisations. Individuals will be required to create their own jobs, which will require a greater level of entrepreneurial skills and aptitudes among future job seekers.
- 5. The growth in the need for 'soft' skills.** As the demand for many forms of manual labour declines, jobs requiring creativity, interaction skills and emotional intelligence will become increasingly important. Those skills are transferrable, and should be developed and recognised.



In addition, we're seeing a convergence of many traditional professions, with many job roles requiring multi-disciplinary skill sets (such as personnel management as well as technical skills).

- 6. Divergent demographics.** Australia's population is aging, with longer life expectancy as well as older retirement ages. Nearly one in five Australians is expected to be over 65 years old in 2035, compared with one-sixth of the population today<sup>5</sup>. The demographic profile of the workforce is likely to contain a larger spread of ages as we move forward.

To some extent the aging workforce can be countered by migration strategies that encourage younger workers. In the past decade, around 80% of migrants were under 40 years old<sup>6</sup>.

These predictions and viewpoints are reflected in other notable sources on the topic, such as the respected 2015 CEDA *Australia's Future Workforce?* report<sup>7</sup> and the McKinsey Global Institute report *Jobs Lost, Jobs Gained*<sup>8</sup>. Those sources also agree that the horizon for these changes is not particularly long, with substantial disruption likely between now and 2035.



## Recommended solutions for Australia

In order to prepare for the coming changes, we believe the government needs to develop a proactive strategy for dealing with structural disruption. As Australia moves away from a reliance on mining, we must now see our human capital as a strategic asset, critical to enabling the knowledge and digital economies of the future, and our future educational system will need to do more to encourage innovative, entrepreneurial and flexible mindsets.

### Educating tomorrow's workforce

When it comes to the jobs of tomorrow, roughly 75% of the fastest growing jobs require STEM (scientific, technical, engineering, mathematics) skills<sup>8</sup>. However, Australia has seen a steady decline in interest in STEM skills among students over the past decade. According to the OECD Programme for International Student Assessment (PISA), Australia's rankings for science and maths have been on a decline since 2003, even as the OECD average rating for science skills has gone up<sup>9</sup>. Between 1992 and 2012 participation by year 12 students in STEM subjects dropped by: 11 per cent for mathematics, 10 per cent for biology, 5 per cent for chemistry, and 7 per cent for physics<sup>10</sup>.

This growing apathy for technical and scientific skills among Australia's youth extends to tertiary education and VET as well. The number of domestic students completing IT degrees, for example, has dropped from 9168 in 2003 to just 5459 in 2016<sup>11</sup>.

We're pleased to note that Australian government is clearly aware of this issue, and has already undertaken programs to arrest the decline, including: the introduction of the Digital Technologies curriculum, the creation of the STEM Partnership Forum, the creation of the National Innovation & Science Agenda and development of long term strategies such as the creation of the *National STEM School Education Strategy*<sup>12</sup>.

There's potentially more than can be done, however, including:

- 1. Setting goals and reward systems for educational institutions that meet STEM teaching targets.** These targets could be based on student assessments that are calibrated against the best international standards.
- 2. A detailed review of the pedagogy of STEM teaching, with a view to increasing student engagement.** This could involve reviewing subjects such as:
  - Teacher training and qualification requirements.
  - Best practices for achieving student engagement.
  - How to achieve greater integration of technical skills into other subject areas, and how to connect STEM with other disciplines of interest to students.
  - Whether a top-down, more standardised approach to the development of STEM skills is warranted. For example, the Digital Technologies curriculum started being rolled out four years



ago. However, schools, while adopting the curriculum, place different emphasis on it dependent on the school's ethos. It's possible we need a more consistent approach to the development of STEM skills in education.

- How best to balance the provision of hardware and software in schools in light of budget pressures.
  - How to better integrate technical skills into early childhood education. As reported by the Office of the Chief Scientist, engagement in STEM disciplines starts in primary school<sup>13</sup>.
3. **Having professional role models that students can identify with.** Government can help facilitate partnerships between industry and academia that exposes students to mentors in high-tech industries through training sessions, internships and the like. This will help eliminate stereotypes and make a career in STEM fields a more appealing prospect. The STEM Partnership Forum, first proposed by the Education Council<sup>12</sup>, had its first meeting last year, and we endorse its efforts to develop a platform for connecting students with mentors.
  4. **Ensuring that the salaries of STEM-qualified educators are sufficient to maintain a healthy population of teachers** capable of engaging students. STEM skills tend to be more valuable in the private sector than many other teaching fields, and the best talent often gets lured away.
  5. **Providing students with accurate information on career prospects and income in technical fields.**
  6. **The development of innovation competitions and incubators** that make computing and other technical fields look exciting for students. The National Innovation & Science Agenda has started positive work on this, and its efforts should continue to be supported.
  7. **Recognition and development of 'soft' and interpersonal skills in all levels of education.** Historically soft-skills were an assumed attribute. As our society has changed and their relevance recognised there needs a recognition that skills are not inherent but need to be taught. These skills are highly transferrable and make career changes easier as the workforce evolves. Some universities have already implemented professional practice courses, and we recommend their development in primary and secondary education as well. To go along with that, we need teachers in schools, VET and university, who have training and formal qualifications in how to teach these skills. This is particularly a problem in universities where academic staff have higher research degrees, but minimal teacher training.
  8. **A program aimed at getting more female students involved in STEM learning.** This program must involve the ICT profession and industry working closely with teachers, parents and career advisory professionals. Importantly, it should also involve identifying and utilising appropriate female ICT role models. It should also start early. Research shows that students make their decisions on gendered career pathways very early on, as early as primary school<sup>13</sup>.



### Retraining adult workers

It's not just students that will be impacted by the changing technology landscape. The displacement of the existing workforce will require a proactive retraining program to prepare the workforce for the structural changes resulting from digital technologies.

We recommend:

1. **Regular evaluation of State and Federal Existing Worker Traineeship funding programs** with an eye on the anticipated short, medium and long-term job destruction and creation effects of digital technologies such as automation and AI. A good starting point is the McKinsey Global Institute's report on *Jobs Lost, Jobs Gained*<sup>3</sup>, which details the sectors most at risk and those that will most benefit from the growth in digital technologies out to 2030.
2. **A recognition of and focus on 'soft' and transferrable skills in funded skill training.** For workers displaced by technology, there should be a program that recognises those transferrable skills and how they can be employed in new sectors.
3. **As the largest employer in the Australian economy, the government has an obligation to lead the way on employment retraining programs.** The public sector should be a net producer of skilled workers, with government employees given the tools they need to succeed in an increasingly skilled marketplace.

We believe collaboration between the Digital Transformation Agency and the Australian Public Sector Commission on the development of a platform for tomorrow's workers and what retraining is needed to push those skills into the workforce would be a valuable exercise.

### Developing a communications strategy

In conjunction with these education programs, we believe the Australian government needs to develop a communications strategy for educating businesses and individuals on the effects of technology changes on their work and enterprise. This should include:

1. **A program to promote the positive value of change.** Overall, the evolution of the economy with digital technologies is a positive development. It has increased productivity, reduced prices and improved the quality of products and services. The average Australian is better off by \$4663 per year as a result of general technological uptake<sup>14</sup>. However, job destruction is often much more visible than job creation, and the government needs to have a plan to answer those complaints.
2. **Developing a program to educate both organisations and individuals on the need to reskill.** These programs should be targeted at sectors most at risk of job losses due to technological advancement and encourage proactive action on skill training.





## A healthy immigration policy

Exponential technologies are likely to create significant structural deficiencies in the Australian workforce in the medium term. In order to counteract that we need a healthy immigration policy, one that can be used to fill skill shortages while ensuring a proper transfer of skills to Australian workers. We believe it should meet these criteria:

1. **It needs to be geared towards filling structural deficiencies in the workforce** rather than taking jobs from Australian workers. Skilled migration in all its forms should be a source of competitive advantage for any country. It should not be at the expense of the domestic labour market and attracting full workforce participation.
2. **It should address issues of migrant worker exploitation.**
3. **There should be a process to ensure that companies that use migrant workers continue to employ and train Australian graduates.** For example, businesses that employ high numbers of migrant workers could also be required to have a plan detailing how they will build a pool of skilled local workers.

## Conclusion

Developing a proactive strategy for dealing with changes to the labour force is essential if Australia is to maintain a healthy level of employment going forward. Historically the economy has adjusted and absorbed job losses in certain sectors, and there's no indication that we cannot maintain full employment for the immediate future.

But we do need to be cognisant of the changing patterns of work and of structural deficiencies in the workforce. Developing strategies to adjust is something we believe is essential to maintain Australia's competitiveness in a global market. This will involve both the development of young talent and the reskilling of existing workers as well as a considered immigration strategy.



## Works Cited

- [1] S. Hajkowicz, A. Reeson, L. Rudd, A. Bratanova, L. Hodgers, C. Mason and N. Boughen, "Tomorrow's Digitally Enabled Workforce," CSIRO, 2016.
- [2] C. Frey and M. Osborne, "The future of employment: How susceptible are jobs to computerisation?," Oxford University, 2013.
- [3] McKinsey Global Institute, "Jobs Lost, Jobs Gained: Workforce Transitions in a Time of Automation," 2017.
- [4] Department of Employment, "Employment Outlook to November 2019," Department of Employment, 2015.
- [5] Australian Institute of Health and Welfare, "Australia's welfare no. 12. Catalogue Number AUS 189," Australian Institute of Health and Welfare, 2015.
- [6] Australian Bureau of Statistics, "Migration, Australia, 2013-14. Catalogue Number 3412.0," ABS, 2014.
- [7] CEDA, "Australia's Future Workforce?," CEDA, 2015.
- [8] PricewaterhouseCoopers, "A smart move: Future-proofing Australia's workforce by growing skills in science, technology, engineering and maths (STEM)," PricewaterhouseCoopers, 2015.
- [9] OECD Programme for International Student Assessment, "Programme for International Student Assessment," OECD, 2015.
- [10] J. Kennedy, T. Lyons and F. Quinn, "The continuing decline of science and mathematics enrolments in Australian high schools," *Teach. Sci.*, vol. 60, no. 2, pp. 34-36, 2014.
- [11] Department of Education uCube, "Custom report," Department of Education, 2016.
- [12] Education Council, "National Stem Schools Education Strategy," 2015.
- [13] R. Prinsley and E. Johnston, "Transforming STEM teaching in Australian primary schools: everybody's business," Office of the Chief Scientist, 2015.
- [14] Deloitte Access Economics, "Australia's Digital Pulse 2017," Deloitte Access Economics, 2017.

