



D15/0106552

Mr I C Blayney, MLA  
Chair  
Economics and Industry Standing Committee  
Parliament House  
GPO Box A11  
PERTH WA 6000

Attention: Dr Loraine Abernethie

Dear Mr Blayney

Thank you for your correspondence dated 26 June 2015 regarding the Inquiry into technological and service innovation in Western Australia.

The Department of Training and Workforce Development has examined the Inquiry's Terms of Reference and our submission is provided in the attachment to this letter.

Technological and service innovation has important implications for skills and participation of Western Australians in the workforce, particularly in the agriculture and food, mining and energy and advanced manufacturing sectors of the economy.

I trust that the sources and other related information provided in the attached submission will prove to be useful for the purposes of the Inquiry.

Thank you for consulting with the Department on this important issue.

Yours sincerely

DR RUTH SHEAN  
DIRECTOR GENERAL

31 AUG 2015

Att

## ATTACHMENT 1

### ECONOMICS AND INDUSTRY STANDING COMMITTEE – INQUIRY INTO TECHNOLOGICAL AND SERVICE INNOVATION IN WESTERN AUSTRALIA

The mission of the Department of Training and Workforce Development (the Department) is to work with its partners to build the Western Australian workforce to meet the State's economic and community needs.

The Department recognises the important influence of technology and innovation across the State's economy and in particular within the key industries of focus for the Inquiry. Research shows that in order for Australia to remain competitive where the global demand for innovation is increasing, employers need to have enough highly skilled people who are able to operate and adapt to a rapidly changing future. This means that the Australian education and training system needs to continue to evolve to address this imperative.<sup>1</sup>

A key role of the Department is to ensure that frameworks are in place to enable the Vocational Education and Training (VET) sector to quickly respond to industry requirements in a changing world, including those around technology and innovation.

Understanding industry needs are an important part of this process. The Department contracts ten industry-linked training councils to provide advice and prepare industry workforce development plans which identify workforce development challenges within their industry area. This advice includes the workforce and training implications of technology and innovation. This informs among other things the development of the appropriate curriculum for training (called training packages<sup>2</sup>).

Training packages describe the skills required to be employable within a particular industry, and are developed through extensive consultation and are validated by stakeholders within the industry. This is part of a nationally consistent industry led VET system which provides endorsed training qualifications to nationally agreed industry standards.

The industry workforce development plans most relevant to the sectors of focus for the Inquiry have been prepared by the Food, Fibre and Timber Industries Training Council (FFTITC), the Resources Industry Training Council (RITC) and the Engineering and Automotive Training Council (EATC). The workforce development plans for these training councils can be accessed from:

<http://www.dtwd.wa.gov.au/workforceplanninganddevelopment/trainingcouncils/Pages/default.aspx>.

The industry workforce development plans include some useful insights into how technology and innovation is impacting upon training and skills development into the future. For example:

The FFTIC Industry Workforce Development plan identified that:

*It is important that new technologies be accompanied by training and skills development. This is largely driven by increased use of precision farming techniques*

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<sup>1</sup> Source: Department of Education, Employment and Workplace Relations December 2008, Review of Australian Higher Education – Final Report, p xi-xvi.

<sup>2</sup> Training packages consist of competency standards, assessment guidelines and qualifications frameworks.

*that rely heavily on accurate analysis and interpretation of large quantities of complex data.*<sup>3</sup>

The RITC *Process Manufacturing* Industry Workforce Development plan identified that:

*Like the resources sector, process manufacturing is also in transition. This transition will be into niche, specialized high quality and globally attractive goods and services. While some of the workforce development implications arising from this transition are yet to be fully comprehended, manufacturing workers of tomorrow will need to have high levels of science, technology, engineering and mathematics (STEM) skills, flexibility, resilience and innovation to meet employer and market requirements.*<sup>4</sup>

And the EATC Industry Workforce Development plan identified that:

*A common theme from employers was an additional requirement for either Automotive Technicians who can also do automotive electrical work or a new role for people with both mechanical and automotive electrical skills. The increasing use of technology in vehicles, has led to a significant change in the skill set required to maintain and repair these vehicles. Representatives of both the agricultural and mining sectors identified a need for technicians with automotive electrical training or vice versa.*<sup>5</sup>

The Department takes into account industry research on the role of technology and innovation in influencing skills development and workforce planning. In particular, the following reports are of relevance to the key focus industries of the Inquiry.

a). *Rise of the Machines, 2012* was a report produced on behalf of the RITC to research the prevalence of automation in Western Australia for the mining, oil and gas and downstream process manufacturing industries. The report focuses on the impacts of automation on productivity and skills development in Western Australia. Further to this, a supplementary report titled *Component Automation in the Australian Mining Industry* was produced in 2014. The RITC has been advocating at a national level for training packages to take into account the role of technology in skills development. The reports can be accessed here: <http://www.ritcwa.com.au/#!/news/c1ghk>

b). *Environmental Scan 2015 of the Agrifood Industry* was a report by Agrifood Skills Australia, and examines factors impacting on the skill needs of the agrifoods workforce. The report can be accessed here: <http://www.agrifoodskills.net.au/?page=EScan15>.

The Department also undertakes its own research to better understand future skills needs and workforce challenges for the State. Within this context, the Department (on behalf of the State Training Board) commissioned Deloitte Access Economics to develop a report on *Workforce Scenarios and Projections, 2013*. It involved the development and modelling of four distinct scenarios, where each represented a plausible and internally consistent 'alternative future' path for Western Australia's economic environment and workforce for the period 2012-2030. The scenarios project a range of possible futures to be used for workforce planning and development purposes.

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<sup>3</sup> Food, Fibre and Timber Industries Training Council, Industry Workforce Development Plan 2014-15, page 95.

<sup>4</sup> Resources Industry Training Council, Industry Workforce Development Plan Process Manufacturing 2014, page 12.

<sup>5</sup> Engineering and Automotive Training Council, Industry Workforce Development Plan 2014, page 68.

Common to all scenarios, the key focus industries of the Inquiry being agriculture, mining, and manufacturing are all projected to have slower than average employment growth compared to other industries.

Considering average output growth alongside the size of the workforce provides an appreciation of the labour intensity of any industry's projected economic growth. In relation to this, agriculture is projected to have a smaller workforce in 2030 than what it currently has, yet is projected to have positive average output growth out to 2030, indicating that innovation and technology efficiency gains are expected to play an important role in the future of the industry. This is somewhat similar for manufacturing, but having lower levels of output. The mining workforce and output levels show a significant degree of variance across the range of scenarios.

The scenarios report states that harnessing new technologies and techniques will be a key factor to achieving productivity gains into the future, but where "digital disruption" will be a key challenge for many sectors. The impact of digital disruption is considered across the modelling for all the economic scenarios presented in the report, though the rate of impact may vary in line with broader productivity growth assumptions. Digital disruption is seen as the key motivator for the continued rapid level of upskilling (involving higher propensities to hold post-school qualifications, including a move towards higher level qualifications) as digitalised workplaces in many sectors create additional demand for re-training and upskilling.

The generic theme for all four scenarios is that the State's workforce into the future is going to be more highly skilled. An extract of relevant components of the report is contained below and the full report is available on request.

*At present Australia, and in particular Western Australia, is starting to see a cyclical improvement in productivity growth as the recent tranche of resources investment starts to pay dividends in the form of higher production and exports.*

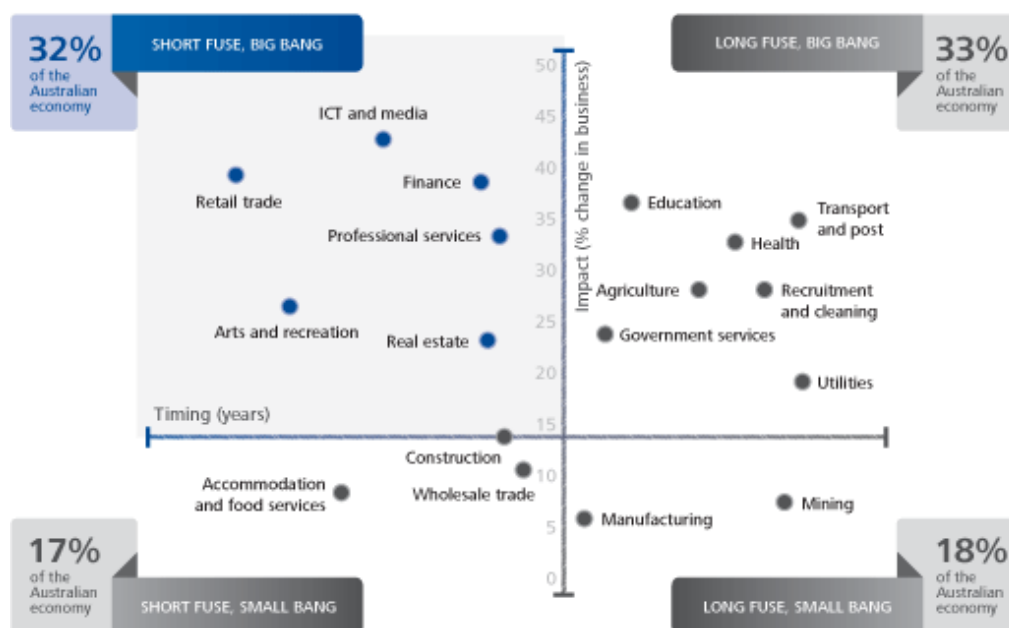
*But that may only be a relatively short term lift. What else can be done to achieve productivity gains?*

*Harnessing new technologies and techniques will be part of the story for governments and businesses, with digital disruption a key challenge for many sectors.*

*Deloitte has recently mapped the expected impact of digital trends on different parts of the economy (see figure 1). Sectors were mapped according to the expected size of the impact upon the sector from digital disruption to the imminence of the change. Those sectors in the top left quadrant (short fuse, big bang) potentially face the biggest disruption in the short term, creating some difficult challenges but also opportunities for significant productivity improvement.*

*The impact of digital disruption is considered across the modelling for all economic scenarios presented in this report, though the rate of impact may vary in line with broader productivity growth assumptions. Digital disruption is seen as a key motivator for the continued rapid level of upskilling (higher propensities to hold post-school qualifications, including a move towards higher level qualifications) - as digitised workplaces in many sectors create additional demand for re-training and upskilling.*

Figure 1: Digital disruption map



Source: Deloitte, *Digital disruption; short fuse, big bang?*, Building the Lucky Country #2 (2012)

*Looking forward, the propensity to hold multiple qualifications continues to rise over time in line with trend rates of increase seen in the past, with this growth regulated by the overall rate of productivity growth expected to be seen in each scenario.*

*As well as the trend for the workforce to have a greater propensity to hold post-school qualifications, increasingly people are also holding more than one post-school qualification. This can occur as a result of further skills deepening (gaining an additional qualification at a higher level), or skills broadening (gaining an additional qualification at the same or level as one already held). These trends are also seen as continuing at varying rates across all scenarios.*

*Indeed, a notable share of the overall future skill needs comes from the trend towards skills deepening and skills broadening. This continues to take place in all scenarios.*

There are a number of further data sources and references the Inquiry may wish to consider as useful contextual information relevant to the focus areas of the Inquiry – particularly in the context of what they may mean for the workforces of the industries the Inquiry is focussing on. These are provided sequentially below.

1). *Australia's future workforce, June 2015* was a report published by the Committee for the Economic Development of Australia (CEDA), and focussed on how technological change may impact Australia's labour market into the future. The report includes a section covering the probabilities of job computerisation in Australia, including the finding that 'regions with high dependence on mining will suffer a bigger impact from automation and computerisation'.

The report also considers drivers of growth across industries such as food and agribusiness; mining equipment, technology and services; oil, gas and energy resources; and advanced manufacturing. In addition the report also includes case studies on automation in Western Australia's mining industry. The full report can be accessed here:

[http://adminpanel.ceda.com.au/FOLDERS/Service/Files/Documents/26792~Futureworkforce\\_June2015.pdf](http://adminpanel.ceda.com.au/FOLDERS/Service/Files/Documents/26792~Futureworkforce_June2015.pdf).

2). *The future of employment: how susceptible are jobs to computerisation paper, 2013* was a report written by Frey and Osborne which examined the probability of computerisation for 702 detailed occupations within the labour market of the United States. The findings of the study are tangentially relevant for Australia, given the somewhat similar occupational structure it has compared to the United States. The full report can be accessed here: [http://www.oxfordmartin.ox.ac.uk/downloads/academic/The\\_Future\\_of\\_Employment.pdf](http://www.oxfordmartin.ox.ac.uk/downloads/academic/The_Future_of_Employment.pdf)

3). *Australia's Digital Pulse, 2015* was produced by Deloitte Access Economics for the Australian Computer Society. The report looked into the role of ICT skills across industry, as well as the impact of digital disruption by industry. The full report can be accessed here: <http://www2.deloitte.com/content/dam/Deloitte/au/Documents/Economics/deloitte-au-economics-australias-digital-pulse-240614.pdf>

4). *Disruptive technologies: Advances that will transform life, business and the global economy, May 2013* was a McKinsey Global Institute report identifying 12 technologies likely to have 'disruptive potential' by 2025: mobile internet; automation of knowledge work; the internet of things; cloud of technology; advanced robotics; autonomous / near-autonomous vehicles; next generation genomics; energy storage; 3D printing; advanced materials; advanced oil and gas exploration and recovery; and renewable energy. The report can be accessed here: [http://www.mckinsey.com/insights/business\\_technology/disruptive\\_technologies](http://www.mckinsey.com/insights/business_technology/disruptive_technologies)

5). The Australian Bureau of Statistics (ABS) provides some primary source data on the level and nature of Australia's current stock of human capital in the fields of science, technology, engineering and mathematics (STEM), including the range of occupations commonly held by STEM graduates – this can be found in the publication: *Perspectives on Education and Training: Australians with qualifications in science, technology, engineering and mathematics (STEM), 2010–11* (ABS catalogue number 4250.0.55.005). The publication can be accessed here: <http://www.abs.gov.au/ausstats/abs@.nsf/Lookup/4250.0.55.005main+features12010%E2%80%9311>

6). The ABS also provides some primary source data on business expenditure and human resources devoted to research and experimental development by industry in the publication: *Research and Experimental Development, Businesses, Australia, 2011-12* (ABS 8104.0). The publication can be accessed here: <http://www.abs.gov.au/AUSSTATS/abs@.nsf/DetailsPage/8104.02011-12?OpenDocument>

7). An international framework, the '[Oslo Manual, Guidelines for Collecting and Interpreting Innovation Data](#)' (Third Edition, 2005) has been developed jointly by Eurostat and the Organisation for Economic Co-operation and Development (OECD) as an aid for measuring the process of innovation, as it contains a basis of concepts and definitions that can be used to measure the incidence of innovation.

This framework has been used by the ABS to provide some data gathered from businesses, based on the definitions of innovating processes and innovation-active businesses. These statistics are included in the ABS publication *Summary of IT Use and Innovation in Australian Businesses, 2013-14, (ABS 8166.0)*. The ABS data is derived from the ABS's Business Characteristics Survey (BCS), which is an annual survey vehicle the ABS uses to produce point-in-time estimates for areas like:

- innovation status by type of innovation;
- drivers of innovation;
- main source of ideas;
- collaboration for innovation; and
- businesses' innovation expenditure.

These ABS statistics on innovation can be cross tabulated by other items such as business size, business age, industry of business (amongst others). As such, the ABS' publication provides some useful background context into innovation across Australian businesses over time. However, please note the statistics are only published at a national level, and so are not published for each of the states / territories. The publication can be accessed from: <http://www.abs.gov.au/AUSSTATS/abs@.nsf/Lookup/8166.0Main+Features12013-14?OpenDocument>

Overall, the Department's own research shows that the State's workforce is going to be more highly skilled into the future in order to evolve with technological change and drive innovation. The Department places a high level of importance on industry involvement in VET and workforce planning and development. Industry feedback suggests that the workforce will need to be equipped with STEM skills in order to acquire new emerging skills as occupational requirements change into the future. Apace with this, technology and innovation will continue to play a significant role in the general upskilling of the workforce, with higher propensities for people to hold post-school qualifications, including a move towards higher level qualifications.