



Submission No 104

Inquiry into potential reforms of National Security Legislation

Organisation: Engineers Australia

SUBMISSION TO THE INQUIRY INTO POTENTIAL REFORMS OF NATIONAL SECURITY LEGISLATION

AUGUST 2012



ENGINEERS
AUSTRALIA

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EXECUTIVE SUMMARY

Engineering applies science-based theory and practice to analyse, design and manage technology-based physical systems and to provide the supporting infrastructure. Engineering is a diverse profession, and engineers are involved in various aspects of security-related organisations, infrastructure and processes. This includes everything from design and maintenance of information technology and communications networks to the design of critical infrastructure and physical assets across the built environment.

Developments in information technology have increased the complexity of the security environment. This requires a substantial change in the competence and skill base of specialists, and engineers in particular. In order to effectively implement, monitor and manage security protocols and systems, including legislated requirements, a significant increase in engineers skilled in network design and security is required.

Over the last decade, the engineering profession in Australia has been experiencing the effects of a skills shortage. While not all engineering disciplines, industry sectors or regions are experiencing shortages to the same degree, the problem is nonetheless severe from a macroeconomic perspective.

The market for engineering labour in Australia has been tight in the past decade, despite a lull in 2009 due to the 'global financial crisis'. It has since recovered and demand for engineering skills is stronger than ever. Every year roughly 9,500 people gain tertiary qualifications in engineering but demand still outstrips supply. This gap in the market is filled by skilled immigration, particularly through the use of the temporary skilled migration (457) visas, the use of which tripled between 2003-04 and 2010-11.

This reliance on overseas skills may have significant implications for recruitment in engineering roles subject to security assessment, such as those in defence projects where an individual's country-of-origin has potential to influence their qualification for certain positions.

During the 1980s and 1990s, engineering establishments in government agencies at all levels were seriously reduced. This 'de-engineering' trend presents significant risks, including an inability to manage engineering contracts because contracting staff lack necessary technical expertise, and the inability of contract staff to adequately assess the engineering competencies of contractors and sub-contractors. These risks open the possibility of large financial and human costs which have been detailed in coronial enquiries, in Australian National Audit Office reports and in numerous Ministerial statements.

The Senate Education, Employment and Workplace Relations References Committee report into engineering skills shortages agrees with Engineers Australia that government agencies should work to retain internal engineering expertise in their workforce through creation of senior technical specialist roles. We believe this is a critical area of workplace reform that would ensure that areas of government with strategic importance, and a role in national security, maintain an adequate technical assessment and advice capability. These areas of strategic national importance, should not, and in many cases could not, be outsourced without creating a significant strategic risk.

INTRODUCTION

About Engineers Australia

Engineers Australia is the peak body for engineering practitioners in Australia, representing all disciplines and branches of engineering. With membership of over 100,000 Australia wide, Engineers Australia is the largest and most diverse professional engineering association in Australia. All Engineers Australia members are bound by a common commitment to promote engineering and to facilitate its practice for the common good. Engineers Australia maintains representation in every state and territory.

Why a Submission from Engineers Australia?

Engineering applies science-based theory and practice to analyse, design and manage technology-based physical systems and to provide the supporting infrastructure. Engineering is a diverse profession, and engineers are involved in various aspects of security-related organisations, infrastructure and processes. This includes everything from design and maintenance of information technology and communications networks to the design of critical infrastructure and physical assets across the built environment.

Engineering expertise plays a central role in government's ability to provide quality technical assessments and processes in the critical national security environment.

The capability and responsiveness of engineering-related aspects of national security is highly dependent on its technological edge. Technology permeates all elements of the security environment, including its infrastructure, doctrine and tactics. However, technology itself cannot achieve this capability and responsiveness; it is the people, knowledge, processes and systems that have shaped the development, selection, integration and operation of our national security capability.

Over the last decade, the engineering profession in Australia has been experiencing the effects of a skills shortage. While not all engineering disciplines, industry sectors or regions are experiencing shortages to the same degree, the problem is nonetheless severe from a macroeconomic perspective.

The seriousness of this problem is reflected by the recently completed inquiry into '*the shortage of engineering and related employment skills*' by the Senate Education, Employment and Workplace Relations References Committee. While the Senate Inquiry focussed on infrastructure delivery, its recommendations are broadly applicable to many areas of engineering, and particularly relevant to public sector agencies, including those responsible for national security issues.

Hence, this submission is intended to broadly inform discussions and expose issues relevant to the engineering workforce currently employed within Australia's national security agencies and processes. We do not provide specific recommendations aside from highlighting issues we have raised in other forums that could reasonably be expected to affect the delivery of national security projects and processes.

The Engineering Profession

The collective membership of Engineers Australia is referred to in terms of the 'engineering team'. The engineering team in Australia is comprised of three groups:

- Professional engineers.
- Engineering technologists.
- Engineering associates.

To qualify for the engineering team, individuals must have formal educational qualifications in engineering. The educational qualifications required are:

- Professional engineers, at least the equivalent of a four year full time bachelor degree in engineering.
- Engineering technologist, at least the equivalent of a three year full time bachelor degree in engineering.
- Engineering associate, at least the equivalent of a two year full time associate degree or a diploma or advanced diploma in engineering

Engineers Australia believes that academic qualifications alone are not sufficient to enable an individual to provide engineering services. As is the case for many other professions, practical skills and experience are also essential, including continuing professional development (CPD). Engineers Australia provides services and arrangements to its members to achieve these standards.

THE ENGINEERING LABOUR MARKET

Overview

Skills and skills development have been important topics in Australian policy forums for several decades, yet statistics for specific occupations and skills remain fragmented and patchy. The statistics discussed in this section are extracts from Engineers Australia's Annual Statistical Overview and are derived from official sources.¹ We employ conventional labour market definitions; thus the engineering population is the subset of the Australian population with formal qualifications consistent with the engineering team, and the engineering labour force is the subset of the engineering population that is employed or unemployed and actively seeking work.

The Australian engineering labour market has been very tight over the past decade. The demand for engineers, as measured by employment, has grown by an average 4.8 percent per annum up to 2010 (from 232,700 in 2001 to 352,900 in 2010). The supply of engineers, as measured by the engineering labour force, also grew at an annual average 4.8 percent (from 242,200 in 2001 to 366,600 in 2010). In 2010, both demand and supply grew faster than the 4.5 percent average annual growth in the engineering population.

The changes underlying this were a falling unemployment rate and a rising labour force participation rate. Labour force participation in the engineering labour market is exceptionally high, averaging more than 90 percent over the past decade, which is several percentage points higher than for comparable non-engineering groups.

Just prior to the 'global financial crisis' (GFC), engineering unemployment was 2.4 percent, a figure consistent with frictional unemployment, that is, the short periods of technical unemployment individuals experience when moving from one job to another. The GFC resulted in an increase in engineering unemployment to 4.1 percent in 2009 before recovering to 3.7 percent in 2010. This recovery is expected to continue in coming years but the structural changes in the economy favouring the resources sector is expected to include similar changes in the industry distribution of engineers.

The number of permanent residents completing courses in engineering in Australia has averaged approximately 9,500 since about 2006, comprised of about 6,000 new degree qualified engineers from the universities and about 3,500 associate degrees and diploma qualified engineers.

¹ Engineers Australia, The Engineering Profession; A Statistical Overview, Ninth Edition, 2012, www.engineersaustralia.org.au

Firm statistics on retirements from the engineering labour force are not available but there are indications that about 5,000 to 6,000 engineers (annually) reach 65 years of age and most likely retire from the labour force. In other words, since about 2006, net domestic growth in the engineering labour force is about 10,000 per year. In comparison, the demand for engineers has been about 13,000 per year and as high as 22,000. The balancing factor has been skilled immigration.

Migration and the Engineering Labour Force

The best available proxy for the trend in skilled migration is the overseas born segment of the engineering labour force. This measure includes children born overseas to migrant parents but effectively raised and trained in Australia, and former migrants who have been resident in Australia for significant time.

While some of the changes in the overseas born engineering labour force can be attributed to these factors, the most important influence has been recent skilled migration. Average annual growth in employment for the overseas born engineering labour force has been 7.9 percent over recent years, three times average annual growth in employment for the Australian born engineering labour force (2.5 percent). The result has been a large increase in the dependence of the engineering labour force as a whole on persons born overseas.

This reliance on overseas skills may have significant implications for recruitment in engineering roles subject to security assessment, such as those in defence projects where an individual's country-of-origin has potential to influence their qualification for certain positions.

In 2001, there were 41.8 percent overseas born individuals in the engineering labour force, and by 2010 this had increased to 52.6 percent. The overseas components of comparable non-engineering skills and the general labour force also increased over the decade but in 2010 were only 36.6 percent and 26.8 percent respectively.

The level of employer-sponsored (457) visas issued for engineering occupations are a useful indicator of the growth in demand for engineers. The number of employer-sponsored visas rose from 2,260 in 2003-04 to 6,940 in 2010-11.² Clearly, looking to temporary skilled migration to fill gaps in a security-critical environment is not a viable option.

The engineering labour market in Australia remains very tight despite record levels of skilled migration in recent years. Time series statistics from the Australian Bureau of Statistics' Education and Work surveys show that although the GFC eased the engineering labour market, this was a temporary stay and since this disruption the engineering labour market has resumed the pre-GFC trend.

When evaluating this view it is important to bear in mind that during the worst of the crisis, engineering unemployment remained very low at a time when permanent immigration was at its highest in a decade. There has been some improvement in the number of domestic students commencing engineering courses and a corresponding increase in course completions is now emerging. However, this is minimal in relation to the excess demand for engineers, which is being covered by skilled migration.

ENGINEERING EXPERTISE IN GOVERNMENT PROCUREMENT

During the 1980s and 1990s, engineering establishments in government agencies at all levels were seriously reduced. Engineers Australia drew attention to the risks associated with the ensuing loss of

² Data provided by the Department of Immigration and Citizenship.

engineering expertise in its 2000 report *Government as an Informed Buyer*³ and in its policy on government purchasing agreed in 2003.⁴ The risks identified included:

- The inability to manage engineering contracts because contracting staff lacked the necessary technical expertise.
- The inability of contract staff to adequately assess the engineering competencies of contractors and sub-contractors.

These risks open the possibility of large financial and human costs which have been detailed in coronial enquiries,⁵ in Australian National Audit Office reports and in numerous Ministerial statements. In its policy statement, Engineers Australia proposed a set of recommendations⁶ and methodological advice to ensure that government as a buyer of engineering, information technology and other technical goods and services adequately addressed technical and engineering risks.

The recommendations recognised the changes occurring in the public sector, in particular decentralisation of control and devolution of decision making, and the broader environment in which procurement takes place, notably increasing technological complexity and the frequency of very large purchases. Engineers Australia believes that it is insufficient to rely on the significant contract management expertise that has been developed in engineering procurement. These skills are vital, but are not a substitute for technical engineering expertise.

Engineers Australia believes the issue of informed engineering decision making runs deeper than a simple numerical adequacy in the number of available engineers. Engineers Australia is firmly of the view that the engineering advice necessary to plan, design, develop and implement major infrastructure and technical programs is provided by engineers with appropriate work experience and a keen appreciation of the progress of engineering technology.

Undoubtedly, the engineering skills shortage will have had an effect on the ability of government agencies to attract and retain suitably qualified engineers. Retaining engineering expertise is critical to effective engineering project delivery. Engineers Australia has been working with engineering employers, including the Department of Defence, to address retention issues through working, for example:

- To increase the number of engineers achieving chartered membership status to verify their commitment to continuous professional development and high engineering standards.
- To encourage greater participation in their initial and continuing professional development.
- To upgrade the engineering qualifications of existing staff through articulation programs to the levels appropriate to full participation in the engineering team.

However, Engineers Australia believes that more can be done to reinforce these efforts to ensure that technical and engineering elements of procurement are fully integrated into purchasing structures and arrangements.

In its report into 'the shortage of engineering and related employment skills', the Senate Education, Employment and Workplace Relations References Committee agreed with Engineers Australia's recommendation that government agencies should work to retain internal engineering expertise in their workforce through creation of senior technical specialist roles. This would provide a technical career

³ Athol Yates, *Government as an Informed Buyer*, Recognising technical expertise as a crucial factor in the success of engineering contracts, Institution of Engineers, Australia, Canberra, 2000, www.engineersaustralia.org.au.

⁴ Engineers Australia, *Public Policy Guide*, 2003, p15, www.engineersaustralia.org.au.

⁵ See Appendix 2 in Yates, *op cit*.

⁶ See Yates, *op cit*. pp. 7-8.

pathway (in tandem with traditional managerial/generalist career pathways) for those seeking to build specialist knowledge while continuing to enjoy career/hierarchical progression.

We believe this is a critical area of workplace reform that would ensure that areas of government with strategic importance, and a role in national security, maintain an adequate technical assessment and advice capability. These areas of strategic national importance should not, and in many cases could not, be outsourced without creating a significant strategic risk.

CONCLUSION

While the terms-of-reference for this inquiry do not directly address workforce capacity or capability *per se*, Engineers Australia believes that the skills shortages currently being felt across areas of the engineering profession have the potential to limit our development capacity in high-tech areas of national security.

Increasingly, government agencies, including those responsible for national security, will face difficulty attracting and retaining suitably qualified engineers and technical specialists. Technology permeates all elements of the security environment, including its infrastructure, doctrine and tactics. However, technology itself cannot achieve this capability and responsiveness; it is the people, knowledge, processes and systems that have shaped the development, selection, integration and operation of our national security capability.

While a range of government inquiries, including a recent Senate inquiry, have examined the implications of engineering skills shortages, Engineers Australia believes that creating whole-of-government awareness is a critical first step in addressing engineering skills shortages in critical sectors of our economy.



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