The Senate

Foreign Affairs, Defence and Trade References Committee

Capability of Defence's physical science and engineering workforce

April 2016

ISBN 978-1-76010-398-9

Foreign Affairs, Defence and Trade Committee
Department of the Senate
PO Box 6100
Parliament House
Canberra ACT 2600
Australia

Phone: + 61 2 6277 3535
Fax: + 61 2 6277 5818
Email: fadt.sen@aph.gov.au
Internet: http://www.aph.gov.au/senate_fadt

Printed by the Senate Printing Unit, Parliament House, Canberra.

Committee Membership

Senator Alex Gallacher, **Chair**	ALP, SA
Senator Chris Back, **Deputy Chair**	LP, WA
Senator Sam Dastyari	ALP, NSW
Senator David Fawcett	LP, SA
Senator Scott Ludlam	AG, WA
Senator Anne McEwen	ALP, SA

Secretariat

Mr David Sullivan, Committee Secretary

Mr Owen Griffiths, Principal Research Officer

Ms Casey Mazzarella, Senior Research Officer

Ms Kimberley Balaga, Research Officer

Ms Shannon Ross, Administrative Officer

Table of Contents

Abbreviations

AAS	Australian Academy of Science
ADF	Australian Defence Force
AMWU	Australian Manufacturing Workers' Union
ANSTO	Australian Nuclear Science and Technology Organisation
APS	Australian Public Service
ASPI	Australian Strategic Policy Institute
BDCP	Building Defence Capability Payment
CASG	Capability Acquisition and Sustainment Group
Coles Review	Collins Class Sustainment Review
CSIRO	Commonwealth Scientific and Industrial Research Organisation
DARPA	Defence Advanced Research Projects Agency
DCM	Defence Classification Manual
DECA	Defence Enterprise Collective Agreement
DGTA	Director-General
DIIS	Department of Industry, Innovation and Science
DMTC	Defence Materials Technology Centre
DMO	Defence Materiel Organisation
DMOSS	Defence Materiel Organisation Support Services
DSTO or DSTG	Defence Science and Technology Organisation or Group
FTE	full-time equivalent
FPR	First Principles Review
PSE	physical science and engineering
QA `	quality assurance
R&D	research and development
RAAF	Royal Australian Air Force
Rizzo Review	Plan to Reform Support Ship Repair and Management Practices
SES	Senior Executive Service
STEM	science, technology, engineering and mathematics
US	United States

Recommendations

Recommendation 1

5.16 The committee recommends that the Department of Defence commit to maintaining its physical science and engineering workforce capabilities in key areas to allow it to be both a 'smart buyer' and a technically proficient owner of materiel.

Recommendation 2

5.17 The committee recommends that the Department of Defence create a role, with appropriate subject matter expertise, analogous to the Director General of Technical Airworthiness, as a regulator to assess the competencies required for specific procurement and sustainment positions and the suitability of candidates to meet those competencies.

Recommendation 3

5.23 The committee recommends that the Department of Defence take a strategic approach to the professional development of its physical science and engineering workforce as part of the Defence Industry Capability Plan.

Recommendation 4

5.27 The committee recommends that the Department of Defence undertake an assessment of workforce models to encourage more flexible and attractive arrangements for its critical physical science and engineering workforce.

Recommendation 5

5.32 The committee recommends that the Australian Government clarify that the Defence Science and Technology Group will not be integrated into the Capability, Sustainable and Acquisition Group.

Recommendation 6

5.33 The committee recommends that the Department of Defence ensure that the roles and responsibilities of the Defence Science and Technology Group are directed to its areas of competence, rather than to technical risk assessments.

Facilitating collaboration

Recommendation 7

5.37 The committee recommends that the Department of Defence, in establishing the Defence Innovation Hub and the Next Generation Technology Fund review the obstacles to public research agencies, academia and industry personnel participating in research and development initiatives.

Chapter 1

Introduction

Referral of inquiry and terms of reference

1.1 On 20 August 2015, the Senate referred matters relating to the capability of Defence's physical science and engineering (PSE) workforce to the Foreign Affairs, Defence and Trade References Committee for inquiry and report by the last sitting day in March 2016.[1] On 15 March 2016, the Senate extended the reporting date of the inquiry to 1 April 2016.[2]

1.2 The terms of reference for the inquiry are as follows:

> The capability of Defence's physical science and engineering (PSE) workforce, with particular reference to:
>
> (a) the importance of the PSE workforce to Defence projects;
>
> (b) the current PSE capability within Defence, the Defence Materiel Organisation (DMO) and the Defence Science and Technology Organisation (DSTO);
>
> (c) the potential risks of a skills shortage in the PSE workforce and a decline in Defence's PSE capability;
>
> (d) the ability of Defence to have relevant PSE capabilities to meet future technological needs;
>
> (e) the ability of new technologies discovered by the PSE workforce to be incorporated into Australia's defence capability planning;
>
> (f) the effect of project outsourcing on Defence's PSE capability;
>
> (g) the ability to attract and retain a highly skilled PSE workforce in Defence, DMO and DSTO; and
>
> (h) any other related matters.

1 *Journals of the Senate*, 20 August 2015, p. 3009.

2 *Journals of the Senate*, 15 March 2016, p. 3944.

Conduct of inquiry

1.3 The committee advertised its inquiry on its website and in *The Australian*, calling for submissions to be lodged by 16 October 2015. The committee also wrote directly to a range of people and organisations likely to have an interest in matters covered by the terms of reference, drawing their attention to the inquiry and inviting them to make written submissions.

1.4 The committee received 34 submissions to the inquiry. Submissions are listed at Appendix 1 and are available on the committee's website at: www.aph.gov.au/senate_fadt. A few submissions from individuals, generally currently employed Defence officers, have been accepted as 'name withheld'.

1.5 The committee held public hearings for the inquiry at Parliament House in Canberra on 17 November 2015 and 5 February 2016. Responses to questions on notice from the public hearings are listed at Appendix 2. The witnesses at those public hearings are listed at Appendix 3.

Structure of the report

1.6 The committee's report is in five chapters. Chapter 2 provides a background to the inquiry including relevant previous reviews and recent policy changes relevant to the Defence PSE workforce. Chapter 3 includes the issues raised during the inquiry regarding terms of reference (a), (b) and (c). It also deals with workforce planning issues. Chapter 4 discusses issues raised regarding the remaining terms of reference. Chapter 5 contains the committee's conclusion and recommendations.

Definitions

1.7 Different contributors to the inquiry have used different definitions of Defence's PSE workforce. While the committee has received some evidence from those that have used broader definitions, it has focused on those roles encompassed by the non-SES work level standards of the Physical Science and Engineering stream within the Defence Classification Manual.[3]

1.8 The terms of reference of the inquiry refer to the Defence Materiel Organisation (DMO) and the Defence Science and Technology Organisation (DSTO). As a result of the departmental changes in 2015, the committee has focused on the successor parts of Defence, the Capability Acquisition and Sustainment Group (CASG) and the Defence Science and Technology Group (DSTG).

3 Part 2 - Work level standards, Defence Classification Manual, 2012, available at: http://www.defence.gov.au/dpe/pac/aps/DCM_chapt_two_pt2.pdf (accessed 25 March 2016).

Acknowledgements

1.9 The committee thanks all those who contributed to the inquiry by making submissions, providing additional information or appearing at the public hearings to give evidence.

Note on references

1.10 References to the committee *Hansard* are to the proof *Hansard*. Page numbers may vary between the proof and the official *Hansard* transcripts.

Chapter 2

Background

Introduction

2.1 This chapter will consider previous Defence reviews and parliamentary consideration which has addressed or touched on the capability of Defence's PSE workforce. In particular, it will summarise relevant aspects of the First Principles Review (FPR) report and the recent Defence White Paper 2016.

Previous Defence reviews

2.2 Defence's PSE workforce capabilities have been part of a number of previous Defence reviews of the acquisition, support and general management practices of the Department, including Kinnaird (2003)[1], Mortimer (2008)[2] and Rizzo (2011)[3]. For example, the *Plan to Reform Support Ship Repair and Management Practices* in 2011 (Rizzo review) included a recommendation that [Defence Material Organisation (DMO)] and Navy 'should develop an innovative and comprehensive through-life career plan for the recruitment, retention and development of their engineering talent'.[4]

Parliamentary consideration

2.3 In 2012, the Senate Foreign Affairs, Defence and Trade References Committee report, *Procurement procedures for Defence capital projects*, identified a number of causes of acquisition project difficulties including shortfalls in skilled labour. The committee considered:

> The critical shortage of engineers and allied technical skills is a matter that requires immediate and serious attention. While there are many external forces undermining Defence's efforts to attract and retain skilled engineers and technicians, the committee is of the view that it is imperative for Defence to grow its engineering and allied skills base. Otherwise, its in-house knowledge will struggle to identify thoroughly future capability

1 Department of Defence, *Defence Procurement Review 2003*.

2 Department of Defence, *Defence Procurement and Sustainment Review*, 2008.

3 Department of Defence, *Plan to Reform Support Ship Repair and Management Practices*, 2011.

4 Department of Defence, *Plan to Reform Support Ship Repair and Management Practices*, 2011, p. 12.

> needs, to test and evaluate it against all other options, and advise government fully, accurately and objectively.[5]

2.4 In 2015, the Defence Sub-committee of the Joint Standing Committee on Foreign Affairs, Defence and Trade report *Principles and Practice – Australian defence industry and exports* explored the impact of procurement policy and practice on the competence of the combined industry and Defence engineering workforce and subsequent effect on Defence capability. Recommendation 7 addressed the need for changes in workforce planning to be closely coordinated with changes in procurement practice. It recommended:

> [W]here an industry-related fundamental input to capability has been identified, the Department of Defence prioritise Australian based procurement contracts so that relevant industry and Defence staff can develop competence in specific tasks via hands-on experience, or where this is not possible, through making the placement of Australian staff in original equipment manufacturers or foreign military engineering bodies a condition of contract.[6]

First Principles Review

2.5 In August 2014, the Minister for Defence established the First Principles Review (FPR) to ensure that 'Defence is fit for purpose and is able to deliver against its strategy with the minimum resources necessary'.[7]

2.6 On 1 April 2015, the Minister released the FPR report *Creating One Defence*. The Minister noted that the government had agreed, or agreed-in-principle, to 75 of the 76 recommendations made by the FPR. In particular, the FPR recommended the Defence Materiel Organisation be disbanded and its core responsibilities transferred to a new Capability Acquisition and Sustainment Group (CASG) within the Department. The Capability Development Group would also be disbanded and its functions transferred to other areas. This included the Australian Defence Test and Evaluation Office and the Project Management Office moving to CASG.

2.7 The government did not agree to the recommendation relating to the Defence Science and Technology Organisation (DSTO) becoming part of the new CASG 'at this time'.[8] However, the Minister noted that 'this recommendation will be further considered as part of the annual updates on implementation progress'. The DSTO, as

---

5 Senate Foreign Affairs, Defence and Trade References Committee, *Procurement procedures for Defence capital projects*, August 2012, p. 192.

6 Defence Sub-Committee, Joint Standing Committee on Foreign Affairs, Defence and Trade, *Principles and practice – Australian defence industry and exports*, 2015, p. 63.

7 Department of Defence, *First Principles Review – Creating One Defence*, 2015, p. 5 (FPR).

8 The Hon Kevin Andrews MP, Minister for Defence, 'First Principles Review of Defence', *Media release*, 1 April 2015.

part of the subsequent restructure, was renamed the Defence Science and Technology Group (DSTG).

2.8 The FPR report advocated that Defence move to 'a leaner "smart buyer" model that better leverages industry, is more commercially oriented and delivers value for money'. The suggested definition of a 'smart buyer' was:

> …one who retains an in-house staff who understands the organization's mission, its requirements, and its customer needs, and who can translate those needs and requirements into corporate direction. A smart buyer also retains the requisite capabilities and technical knowledge to lead and conduct teaming activities, accurately define the technical services needed, recognize value during the acquisition of such technical services, and evaluate the quality of services ultimately provided...[9]

2.9 The FPR also recommended 'that the focus on public service reductions as the primary efficiency mechanism for Defence cease'. It noted:

> Downsizing is already occurring within Defence with full time equivalent staff reducing from approximately 22,300 in mid-2012 to around 19,500 in October 2014. These reductions have largely been achieved through natural attrition and a tightening of recruitment practices.
>
> Whilst these arbitrary approaches are delivering results, the review team believes a more targeted approach would produce more control over the shape and skills of the workforce.[10]

Defence White Paper 2016

2.10 On 4 April 2014, the Prime Minister and the Minister for Defence announced that a new Defence White Paper would be produced (originally scheduled to be released mid-2015). A number of the submissions to the Defence White Paper process highlighted PSE workforce capability issues. These issues were also picked up in the consultations undertaken by the External Panel of Experts report. For example, one of the recommendations of the panel was that the Defence White Paper 'ensure that appropriate priority is given to defence science as a critical enabler of innovation and military capability'.[11]

2.11 The Defence White Paper was eventually released on 25 February 2016. Under the plans in the paper, the permanent ADF workforce would grow from around 58,000 to 62,400 over the next decade. It also provided for a future Defence APS workforce of 'around 18,200 Full Time Staff Equivalent (FTE), down from 22,300 FTE in June 2012'. It stated:

---

9 FPR, p. 33.

10 FPR, p. 67.

11 External Panel of Experts on the 2015 Defence White Paper, 'Guarding Against Uncertainty: Australian Attitudes to Defence, *Report on Community Consultations*, March 2015, p. 58.

> Within this total workforce of around 18,200 FTE, enhancements to intelligence, space and cyber security capabilities will involve 800 new APS positions. Four hundred new positions will be created in information technology support, simulation, support to Navy engineering and logistics, security, force design and analysis, and strategic and international policy, including civilian policy officers posted overseas.
>
> These new APS positions in areas of high priority will be offset by ongoing reductions elsewhere in the APS workforce, including through the reform of service delivery areas of Defence's business, as part of the implementation of the Government's First Principles Review.[12]

2.12 The Defence Industry Policy Statement and the Integrated Investment Program, both also released on 25 February 2016, reflected the Defence White Paper's emphasis on innovation and technology as significant drivers of Defence capability. Key initiatives included:

- a Centre for Defence Industry Capability to provide a single governance framework to consolidate a number of existing Defence industry programs. This includes developing future delivery models for the Skilling Australia's Defence Industry program and the Defence Engineering Internship program.[13]
- a Defence Innovation Hub to manage a portfolio of existing funded investments in Defence innovation including the Defence Materials Technology Centre (DMTC). The Defence Innovation Hub will have funding of around $640 million over the decade to FY 2025–26, inclusive of the $3 million per year for the DMTC FY 2018–19;[14] and
- a Next Generation Technologies Fund with $730 million over the decade to FY 2025–26 to enable Defence to better position itself to respond to strategic challenges, retain a technology 'edge' against adversaries and provide game-changing Defence capabilities for the future. The DSTG will take the lead in identifying, conducting and integrating research in next generation technologies that are relevant to Australia's national security.[15]

2.13 In relation to Defence workforce issues, the Integrated Investment Program included the following:

> The generation of sustainable workforce capacity in key skill areas will require concerted effort well beyond the mid-2020s. There will continue to be challenges in attracting, recruiting and retaining the right people for the right jobs in an increasingly competitive market place. The strength of Defence's leadership and its ability to adapt and embrace a more diverse

12 Department of Defence, *Defence White Paper 2016*, 2016, p. 150 (Defence White Paper 2016).

13 Department of Defence, *Defence Industry Policy Statement*, 2016, p. 69 (Defence Industry Policy Statement).

14 Defence Industry Policy Statement, p. 71.

15 Defence Industry Policy Statement, p. 72.

and inclusive culture will be critical to attracting and retaining the workforce it needs for the future. Defence will employ a range of strategies to achieve the skilled workforce required in the timeframe needed to deliver and support the future force.

It is essential that Defence pursues enterprise solutions to workforce challenges, including a more strategic approach to workforce planning; enhanced information and communications technology systems will be critical to this work. This approach will need to better enable Defence to sustain a diverse range of specialist training and skills development, and will be further articulated in the strategic workforce plan being developed as part of the implementation of the First Principles Review.[16]

16 Department of Defence, *Integrated Investment Program*, 2016, p. 22 (Integrated Investment Program).

Chapter 3

Current capability, importance, potential risks and workforce planning

Introduction

3.1 Chapter 3 will cover the first three terms of reference of the inquiry. In particular, it will consider evidence received relating to the current capability of the Defence PSE workforce, its importance and the risks of skills shortages and a decline in Defence's PSE capabilities. It will also consider workforce planning issues.

Current Defence PSE workforce

3.2 Defence provided an overview of the current Defence PSE workforce in its submission to the inquiry (extracted below). This workforce covers members of the Australian Defence Force (ADF), the Australian Public Service (APS) and support from Defence contractors. It stated:

> In July 2015, there were 14,534 ADF members working in the engineering and technical domain and 2,815 ADF members working in the ICT domain. The ADF does not have a dedicated 'physical science' workforce stream, but is organised around corps, categories or musterings across Navy, Army and Air Force. The ADF PSE workforce is directly aligned to capability outputs and supports tasks ranging from warfighting, to sustainment, to meeting military or departmental requirements. Members of the engineering and technical workforce are recruited at entry level and trained by the ADF, with each service undertaking its own workforce demand, management and supply functions.[1]

3.3 The APS PSE workforce currently comprised 9,748 employees often integrated with ADF members. Defence noted that while this number has fallen from 'a high of around 10,500 in 2013' it has remained static as a proportion of the overall number of employees working in the Department.[2]

3.4 The Defence PSE workforce was organised around eight 'job families', with positions grouped according to technical or functional disciplines.[3] These included:

- 2,050 in the Science and Technology job family;
- 2,050 in the Engineering and Technical job family;

---

1 *Submission 28*, p. 2.

2 *Submission 28*, p. 6.

3 *Submission 28*, p. 2.

- 2,100 in the Intelligence and Security job family;
- 1,550 in the Logistics job family;
- 1,300 in the Information Communication Technologies job family;
- 450 in the Health job family;
- 150 in the Senior Officer job family; and
- 150 in the Trades and Labour job family.[4]

3.5 The Defence submission also provided additional information on the roles and responsibilities of the two key groups, the Defence Science and Technology Group (DSTG) and the Capability Acquisition and Sustainment Group (CASG) (extracted below).

3.6 The Defence Science and Technology Group's PSE workforce falls within the Science and Technology job family. It completes the following roles:

- supporting operational capability with science and technology expertise;
- providing science and technology support to Defence to sustain and enhance current capability;
- providing science and technology support throughout the genesis, development, acquisition and introduction into service of major capability projects;
- conducting research into high-impact areas for future Defence capability;
- scanning the environment to gain an understanding of emerging science and technology threats and opportunities;
- investigating client-focused future concepts, contexts and capability through science and technology;
- shaping defence and national security strategic policy through expert and impartial science and technology advice;
- leading the coordination and delivery of science and technology to enhance whole-of-government national security;
- enhancing Defence science and technology impact by collaborating with research and industry partners, nationally and globally; and
- promoting defence science and education in the broader Australian community.

3.7 The Capability Acquisition and Sustainment Group's PSE work is responsible for:

4 *Submission 28,* p. 6.

- deriving, translating and analysing Defence requirements of military equipment to the level that can be expressed in specifications used for contracting purposes;
- providing advice on technical implementation feasibility, risks, costs and issues in the identification of options and trade-offs in capability development leading to Government approval;
- preparing the plans, strategy and statement of work in contracts that accurately reflects the system development, modification, and integration activities to be conducted;
- monitoring progress and representing the Commonwealth's interests in the execution of contracts to ensure that vendors are delivering as required in terms of cost, schedule, and product capability;
- initiating and conducting reviews of technical issues associated with acquisition, sustainment, and disposal of military equipment;
- ensuring that military equipment satisfies Australian Law and Regulation throughout its service life;
- ensuring that equipment meets Technical Regulatory requirements throughout its service life;
- ensuring the military equipment is operationally available when required; and
- providing on-going analysis to ensure the effective and efficient management of military equipment throughout its service life.

3.8 Others also highlighted the diverse roles and spectrum of work undertaken by the Defence PSE workforce. The Australian Manufacturing Workers' Union (AMWU) noted that the Defence PSE workforce included 'trade work, information technology work, work in a physical science or engineering and management work associated with any of these'. It outlined:

> The [Defence Classification Manual (DCM)] describes "physical science or engineering" as including "Air Traffic Control, Avionics, Bio/chemistry, Dental assistance/therapy, Engineering, Fuel Science, Geoscience, Graphic Design, Land Surveying, Logistics, Marine Surveying, Materials Science, Metallurgy, Meteorology, Metrology, Naval Architecture, Oceanography, Petroleum Technology, Pharmacy, Physics, Surveying and Textile Technology".[5]

3.9 The complex nature of the PSE workforce within Defence was often emphasised. Northrop Grumman observed that within Defence there are a variety of entities and functions involved with 'defence science and engineering' activities:

> Some are standalone units; some are functional responsibilities within other entities; some are within the Defence Science and Technology Group; and

5 *Submission 17*, p. 3.

> some are within other parts of the Australian Defence Organisation, including the Services. Typical of these science and engineering related functions are: test, evaluation and development; modelling and simulation; operational analysis; materials testing; etc – with perhaps the best known of these entities being the RAAF Aircraft Research and Development Unit.

3.10 The emphasis on the diverse nature of the Defence PSE workforce led to arguments that tailored and specific approaches were required. For example, Northrop Grumman stated that 'discrimination needs be made between defence science and defence engineering, given the different application of the two diverse disciplines within Defence, and the need for a tailored management approach to each'.[6] Dr Andrew Davies from the Australian Strategic Policy Institute (ASPI) also described the different roles played by each professional group:

> Defence needs engineers and scientists. It needs engineers to help it identify and manage risk in projects and to manage its fleet of complex platforms and complex data and communications architectures. It needs scientists to collect data and conduct research that help inform operations and force structuring decision making and to investigate novel and promising technologies…
>
> Engineers in Defence are mostly about managing and reducing risk and uncertainty….while scientists require uncertainty to have sufficiently worthwhile problems to examine. There's a subtle but real conflict of interest here.[7]

Importance of Defence's PSE workforce

3.11 There was broad agreement with Defence's description of its PSE workforce as 'critical to the organisation'.[8] Defence PSE workforce was perceived as important to Defence projects, as well as more generally to Australia's security and national interest. For example, Mr Callinan and Mr Gray observed:

> Just as Australia's circumstances are unique, so too are our defence needs, dependent as they are on geography, population (talent), budget and access/limits to overseas sources of PSE. This creates a unique demand for an onshore defence PSE capacity…An effective PSE workforce underpins all our defence efforts in an increasingly technologically driven world.[9]

3.12 Similarly, Northrop Grumman observed that '[a]s a capability enabler, the Australian Defence Organisation's science and engineering resource is of critical importance to Australia's national security'.[10]

---

6 *Submission 26,* p. 2.

7 *Submission 19,* pp 1-2.

8 *Submission 28,* p. 6.

9 *Submission 16,* p. 4.

10 *Submission 26,* p. 2.

3.13 Several key areas were emphasised in discussing the importance of the Defence PSE workforce, including being a 'smart buyer', operational support, defence-specific research, economic value and safety.

A smart buyer and user

3.14 The significance of the PSE workforce's advice and support for Defence acquisitions, sustainment and maintenance was the most frequently stressed aspect of the PSE workforces' importance. Defence noted it was 'reliant upon a materiel engineering and maintenance capability to efficiently and effectively define, acquire and support materiel that is fit-for-purpose, and legally compliant':

> Further, the PSE workforce plays a critical role in delivering required capability through providing advice, assurance and risk management. The workforce also plays an essential role in ensuring that industry continues to deliver Defence capability through cost effective and productive partnerships between industry and Defence.[11]

3.15 The Australian Manufacturing Workers' Union (AMWU) noted that 'approved expenditure for a single acquisition project can be up to $15.2 billion in total and up to $890 million in a single year, with the total approved expenditure for the top 30 acquisition projects being nearly $57 billion'.[12] The AMWU highlighted a report undertaken by Deloitte in 2012 on the engineering and technical stream:

> Ensuring Defence has appropriate APS engineering and technical skills is of critical importance for a number of reasons; most importantly because the APS engineering and technical workforce is central to the management of the integrity, worthiness and safety of capability over its lifetime. The workforce plays a critical role in delivering required capability through providing advice, assurance and risk management. The workforce also plays an essential role in ensuring that industry continues to deliver Defence capability through cost-effective and productive partnerships between industry, the Australian Defence Force (ADF) and APS.

3.16 Several submissions and witnesses emphasised the need for Defence to have a sufficient PSE workforce to allow it to be a 'smart' buyer or an informed customer. For example, Dr Davies noted that in his experience, having in-house expertise from public service engineers who could examine bids for work from external firms made him 'a much smarter buyer'.[13]

3.17 The Royal Institute of Naval Architects (RINA) considered the 'core importance of the physical sciences and engineering workforce is to provide Defence

11 *Submission 28*, p. 6.

12 *Submission 17*, p. 4.

13 *Committee Hansard*, 5 February 2016, p. 2.

(including ADF) with sufficient skills to be "informed customers and users" of the technical equipment that it acquires and uses'.[14] It stated:

> Defence policy over the past two or three decades has been, wherever possible, to purchase proven existing designs. However…the designs on offer in relation to a specific requirement invariably need to be closely examined and adapted to meet the engineering, strategic, environmental, safety and operational requirements of the Royal Australian Navy. For these purposes, the PSE workforce needs to have appropriate skills to ensure that the ship when in service, as the end product of the acquisition process, fulfils the capability, sustainability and reliability requirements of the Navy.[15]

Operational support

3.18 The capacity of the PSE workforce to provide responsive field support and advice to the ADF on operations was also highly valued. Work that DSTG has undertaken to provide advice and solve specific problems for ADF operations in Iraq and Afghanistan was often cited in submissions.[16] Defence noted that 'the ability of the workforce to respond rapidly to changes in military needs, particularly regarding force protection, remains a fundamental role for the Science and Technology and Engineering and Technical job families'.[17]

Defence specific research and development

3.19 Many submitters pointed to the increasing role of advanced technology in the operations of modern military forces. Defence noted that over 'the past two decades Western militaries have transitioned from being the primary driver of global technology innovation to becoming targeted innovators of defence unique technology, and fast followers/adopters of commercial technologies'. In this context, the importance of defence-focused science was repeatedly emphasised. For example, Mr Lovell from Northrop Grumman stated:

> While academia is heavily involved in doing some fundamental scientific research and some of it has military application, there are quite a number of areas that it is just not in the interests of academia to even look at, quite frankly. The other thing is that industry, while it does do scientific research, is mainly focussed on engineering and developing new products, because essentially it is about return to shareholders. So we believe that it is really important for Defence to do defence related science, the sorts of science that we see DSTG doing.[18]

---

14 *Submission 27*, p. 4.

15 *Submission 27*, p. 5.

16 For example, Professionals Australia, *Submission 25*, p. 11.

17 *Submission 28*, p. 6.

18 *Committee Hansard*, 17 November 2015, p. 7.

Economic value

3.20 The First Principles Review (FPR) acknowledged that the then DTSO undertook 'good work' but that it 'struggled to articulate clearly to the review team the value that it contributes to Defence outcomes'. It recommend DSTG be required to 'clearly articulate its value proposition'.[19]

3.21 As part of the implementation of the FPR recommendations, DSTG commissioned an independent study of the economic value of Defence's science and technology program since 2003. Ten case studies were considered by ACIL Allen Consulting including DSTG's projects for the Jindalee Operational Radar Network and the F/A-18 Structural Refurbishment. It conservatively assessed the tangible economic benefits of the DSTG's research and support associated with the ten case studies as being approximately $5.1 billion. It concluded:

> In taking into account the conservative bias in our assessment of benefits and the case studies represent a relatively small proportion of the total [DSTG] effect, it may be reasonable to conclude that the extension of the case study approach across all [DSTG] projects would yield 4 to 5 times the value ($20 to $25 billion).[20]

Safety

3.22 An effective Defence PSE workforce was also perceived as critical to protect the safety of ADF personnel and others. For example, Professionals Australia described how a lack of investment in technical integrity could result in 'another Sea King, Westralia or Nimrod', referring to well-recognised military accidents in Australia and the UK which were at least partially attributed to failures in engineering and technical safety. Similarly, Mr Peter Leggatt highlighted the potential risks of flawed or faulty ammunition and ordnance provided to the ADF:

> Any future decline in [Proof and Experimental Establishment] capabilities and of the physical sciences and engineering will limit the ability of the Government through Defence to provide safe and suitable explosive ordnance that increases our force multiplication and also the ability to investigate and analyse future incidences of failure of defence ammunition and ordnance, of which historic evidence suggests is increasing…
>
> While the above is a physical science issue, the moral issue of the government abrogating its responsibilities of ensuring soldiers, sailors and airmen/women are supplied with safe and effective ammunition/ordnance sourced from commercial suppliers whose primary interest is profit, is of serious concern.[21]

---

19 FPR, p. 41.

20 ACIL Allen Consulting, *Economic impact case studies establishing the economic value of the Defence science and technology program*, 31 August 2015, p. 4.

21 *Submission 14*, pp 2-3.

Potential risks

3.23 Several submissions argued that the capabilities of Defence's PSE workforce have been reduced over the previous decade and that a number of skills shortages had been allowed to develop. Professionals Australia noted that when HMAS Kanimbla broke down in Sydney Harbour in 2010 and was subsequently decommissioned, the Rizzo review 'attributed the disaster to shortcuts in maintenance and the loss of engineering capability in Defence'. It also outlined a series of other previous failures or 'near misses' which it attributed to a reduction in technical and engineering expertise in Defence. It stated:

> The responsiveness and capacity of the Australian Defence Force is fundamentally underpinned by the knowledge and expertise of the engineering, science and technical workforce - the people who develop, select, integrate, maintain and operate our modern defence effort. The problem is this intellectual capital has been run down to dangerous levels.[22]

3.24 Mr Alan Gray and Mr Martin Callinan also noted that public records suggest that 'the PSE workforce in Defence has recently diminished and current services are under significant stress':[23]

> From a Budget perspective, in areas where the PSE workforce is most likely to be found, namely defence R&D, data says that total expenditure on defence R&D has fallen steadily since 2011. Further, the government R&D share of the overall defence R&D budget has dropped from 2% in 2008-09 to a forecast 1.1% in 2017-18. Between 2012-13 and 2017-18, DSTO is budgeted to reduce expenditure by around $169 million.
>
> In short, Australian defence science and technology investment, as a proportion of defence spending, is less than that of the Netherlands, Canada, Sweden and Singapore. With respect to population growth, per person expenditure has more than halved since 1977.[24]

3.25 Mr Gray and Mr Callinan suggested that Defence had followed the usual pattern of organisations when confronted by budget and staff cuts 'namely, to protect at all costs existing programs and activities'. This situation had created conditions that 'discourage risk and innovation and is exacerbated by government signals that no new policy or program initiatives will be considered without offsetting savings'.[25]

3.26 The AMWU pointed to budgetary cuts, outsourcing and centralisation of Australian Public Service workplace relations policy as leading causes of these reductions in capabilities.[26] Mr Nicholaides from the AMWU told the committee 'that

---

22 *Submission 25*, p. 2.

23 *Submission 16*, p. 5.

24 *Submission 16*, p. 5.

25 *Submission 16*, p. 7.

26 *Submission 17*, pp 9-10.

Defence has in recent times lost a great deal of PSE experience and is about to lose considerably more'. He noted that in 2014 the average age of the engineering and technical job family was estimated to be 52.[27] Defence personnel also provided submissions which highlighted concerns in their areas regarding PSE capabilities. A loss of technical capabilities and experience was frequently highlighted. Some referred to PSE capability being 'one deep', implying that if a single person retired, took a redundancy or moved to the private sector a key area of technical expertise would be lost.[28] Mr Smith from Professionals Australia stated:

> We have a workforce that is rapidly headed towards retirement. Our view is that across too many disciplines, because we are either only one deep or, at the most, two or three deep, we do not have the expertise to be a smart buyer. We do not have the capacity to be necessarily in both the procurement and sustainment spaces.[29]

3.27 RINA contended that 'the many Defence re-organisations imposed over the past 25 years, with many PSE staff taken/transferred from the original Service technical areas, has resulted in the organizational separation of staffs into small groups of engineers that are relatively isolated from one another and below a critical mass for adequate staff development'. [30]

3.28 Mr Bushell, a retired Air Commodore, described DMO as having 'floundered' because it had been administered by people lacking in sound knowledge of the military capabilities being acquired, their unique operational and engineering challenges and the project methodologies critical to their management:

> The result has been a series of extremely costly project failures in required capabilities, schedule, cost and adverse impacts upon Australia's military capabilities. What is needed are hard-core operational, engineering and project management competencies appropriate to the system being acquired, and the technologies comprising it.[31]

3.29 A particular area of concern was the role and stress on the PSE workforce in DSTG. DSTG's budget for 2015-16 is $432 million, which is approximately 1.4 per cent of the total Defence budget.[32] The Defence Annual Report 2014-15 stated that one of the Key Performance Indicators for 'Programme 1.9 Defence Science and Technology' was 'substantially met'. However it noted that '[b]udget management and

---

27 *Committee Hansard*, 5 February 2016, p. 12.

28 For example, Mr Hunter, AMWU, *Committee Hansard*, 5 February 2016, p. 17.

29 *Committee Hansard*, 17 November 2015, p. 22.

30 *Submission 27*, p. 8.

31 *Submission 1*, p. 1.

32 ANAO, 'Managing Science and Technology Work for Defence – Defence Science and Technology Group', *ANAO Report No. 19 2015-16*, p. 15.

rebalancing within the department led to Defence clients agreeing to some medium- and lower-priority tasks being cancelled or deferred'.[33]

3.30 Mr Day, an electronic technician, considered that the government seemed to be happy to let DSTG 'wither and die':

> The average age of workers here is 52 and there's been almost no recruitment for 8 years. Staff numbers are falling, especially in the technical ranks, and the admin overhead is increasing, so we're having difficulties meeting our work commitments.[34]

3.31 Concerns were expressed during the inquiry that the role of the DSTG had altered. For example, Mr Gray told the committee that 'since the Kinnaird review in 2003, the mission for [DSTG] has changed':

> You are seeing far less of that new technology and the technology that will make a difference for the war fighter in the battlefield to win and prevail. They are not doing as much of that as they used to. They are still doing a bit, but they are now being drawn more and more into being expert advisers or consultants on particular matters.[35]

3.32 Dr Davies also outlined challenges for DSTG. He considered Defence had 'blurred the lines' by asking DSTG 'to perform what is effectively a systems engineering task in the form of technical risk assessments in support of decision making on major projects'. He argued:

> At best that is a misapplication of expertise, and at worst it is a recipe for poor engineering outcomes. Either the [DSTG] has to move into the business of engineering, thus diluting its core science mission, or it will bring a scientific mindset to an engineering problem.[36]

3.33 This potential risk to DSTG's scientific research role was also articulated by others. For example, the Australian Academy of Science urged that Defence 're-commit to a program of basic and applied scientific research as a core activity, to develop future expertise and technology'.[37]

3.34 The consequences of a decline in PSE workforce capability were perceived as serious. For example, Dr Davies noted that '[i]f you do not have sufficiently robust engineering capability to run major projects, particularly in a rigorous systems engineering way, you get poor outcomes in terms of project schedule, budget and sometimes capability outcomes as well'.[38]

---

33 *Defence Annual Report 2014-15*, p. 59.

34 *Submission 11*, p. 1.

35 *Committee Hansard*, 17 November 2015, p. 28.

36 *Committee Hansard*, 5 February 2016, p. 1.

37 *Submission 9*, p. 3.

38 *Committee Hansard*, 5 February 2016, p. 2.

3.35 Mr Callinan and Mr Gray described the 'real risk posed by having neither adequate PSE skills within Defence nor being able to readily and quickly harness such skills from outside of Defence, is that our national security system will not be suitably agile in responding to surprise developments'.[39] Mr Gray characterised Australia's technological advantage in defence as 'eroding':

> Some of this erosion is self-inflicted. To be frank, we have taken our eyes off the technology ball to the extent that today Australia is lagging vis-a-vis a number of our neighbours in the Asia-Pacific in building and investing in high-quality science, technology, engineering and mathematics research capacities and infrastructure.

3.36 In contrast, Defence assessed the 'the risk of a skills shortage in its PSE workforce and decline in PSE capability to be low'. While it acknowledged that some 'shortages remain in a limited number of related trade and technician occupations', Defence considered they were likely to 'ease in the short term'.[40]

3.37 Defence argued that the PSE workforce has continued to be effective in supporting Defence and the Australian Government. It noted that the 'ADF is running multiple overseas and domestic operations, and Defence is undertaking classified high-end research while simultaneously improving force protection for Australia's partners in Afghanistan' while simultaneously there are 180 acquisition projects under way. Defence argued that its PSE workforce has achieved this success during a period of APS downsizing through careful management of priorities against workforce resources. It outlined that Defence monitors its PSE workforce against capability requirements and seeks to recruit APS staff before vulnerabilities emerge.[41]

3.38 Ms Skinner, Deputy Secretary of Defence People Group, told the committee:

> It is worth noting that successive governments have asked us to reduce the size of the APS workforce, and we have come down from a high of 22½ thousand three or so years ago to around 18,000 today. It means that the physical science and engineering workforce reductions have generally been in line with those of the rest of the department, with changes driven by need. The variation in PSE numbers has not compromised Defence's ability to meet capability and government requirements, and that remains the focus of how we make our decisions.[42]

Defence PSE workforce planning

3.39 A June 2014 internal audit of the Defence Materiel Organisation's engineering and technical workforce concluded that the state of its engineering and technical workforce was 'a risk to Defence capability'. It noted that DMO has limited visibility

39 *Submission 16*, p. 7.

40 *Submission 28*, pp 8-9.

41 *Submission 28*, p. 2.

42 *Committee Hansard*, 5 February 2016, p. 21.

of their workforce skills, no targeted strategies for attraction and retention of the right skills and resources required for future capability and no ability to model engineering and technical workforce requirements for the future.[43] These concerns were echoed in the First Principles Review. It recommended Defence 'build a strategic workforce plan for the enabling functions, and incorporate workforce plans for each job family in order to drive recruitment, learning and development, performance and talent management'.[44]

3.40 Insufficient or inadequate workforce planning was a common issue raised in submissions. Mr Alan Gray and Mr Martin Callinan suggested the committee 'may find it difficult to establish the true state of PSE capability within Defence as the statistical collections within the portfolio are not collected or managed in a fashion that make it simple for Parliament to draw ready or accurate conclusions about even the numerical state of the PSE workforce'.[45] Mr Gray told the committee that there was 'an urgent need for Defence to bring out a PSE labour force blueprint which charts civil and ADF labour force challenges, needs and requirements over the next 10 to 15 years':

> Aside from providing as much certainty as possible for the PSE community within Defence, however you define that, such a document would also be invaluable for our universities and technical institutions in helping them plan and develop programs which would meet the fewer recruitment needs of Defence and the national security community.[46]

3.41 The RSL noted that it has previously made submissions that described the fact that Defence does not systematically collect, store and update comprehensive information on the skills of its enabling workforce as 'a major failing'. It has previously argued that Defence 'has limited visibility of their workforce skills…no targeted strategies for attraction and retention of the right skills and resources required for future capability....no ability to model engineering and technical workforce requirements for the future'.[47]

3.42 Mr Efthymiou from Professionals Australia characterised Defence's previous workforce approaches as being incorrectly focused on restraining 'inputs':

> When you start to look at something from the input side, you start to treat it as a cost, as a liability to be minimised and a cost to be reduced. If you were to look at it…as an investment—what could you achieve if you had more staff—you may get a different view of things.[48]

---

43 Ernst and Young, 'Internal Audit of the Professionalisation of Engineers', 2013/14 No. 6, *Final Report*, Department of Defence, June 2014, p. 5.

44 FPR, p. 57.

45 *Submission 16*, p. 5.

46 *Committee Hansard*, 17 November 2015, p. 26.

47 RSL, *Submission 4*, p. 3.

48 *Committee Hansard*, 17 November 2015, p. 25.

3.43 Mr Grimm also criticised 'the current crude APS Full Time Equivalent (FTE) count' approach to workforce planning. He noted:

> FTE makes no discrimination between pay grades (ie: actual salary costs) and indirectly encourages the engagement of external service providers simply to overcome FTE restrictions, in order to complete the necessary work, even if this comes at a higher total cost.[49]

3.44 Defence acknowledged the workforce planning issues raised in the First Principles Review. It noted:

> The sources of risk included:
>
> i. Limited visibility of engineering and technical workforce skills.
>
> ii. No targeted strategies for attraction and retention of the skills and resources necessary for future capability.
>
> iii. No ability to model the engineering and technical workforce requirements for the future.
>
> iv. Insufficient support from the Defence People Group to the Defence Materiel Organisation (now the Capability Acquisition & Sustainment Group).[50]

3.45 It outlined:

> Defence will deliver a comprehensive workforce strategy following the release of the White Paper and Force Structure Review. The First Principles Review recommended developing the strategy to avoid repeating the patchwork of initiatives drawn from previous reviews that had considered elements of the Department's workforce in isolation. The priorities set by the White Paper and Force Structure Review will influence how Defence uses the strategy to shape its workforce to meet the requirements of the Government. This improved corporate planning will also drive improved oversight of Defence's workforce and facilitate earlier warning and more agile responses to workforce challenges as they emerge.[51]

3.46 As noted above, the Defence PSE workforce is organised around eight 'job families', with positions grouped according to technical or functional disciplines. In particular, functions supporting sustainment or the acquisition of Defence materiel generally belong to the Engineering & Technical job family, and the DSTG's workforce falls within the Science and Technology job family. However, Defence outlined that a single profession can be represented in multiple job families, for example engineers are also represented in the ICT and Intelligence and Security job

49 *Submission 23*, p. 2.

50 *Submission 28*, p. 3.

51 *Submission 28*, p. 4.

families.[52] Defence noted that it had made some adjustments to the job family construct during the period 2012-2015:

> Primarily, these changes were to more closely align departmental arrangements with the Australian Public Service Commission job family construct and the overarching Australia New Zealand Standard Classification of Occupations (ANZCO). Changes to job families are aimed at providing more accurate descriptions of the roles being carried out and do not affect the work being conducted by employees. Defence will continue to make adjustments of this nature, as the impact of changing technology, profession changes and ongoing evolution of roles within the Department necessitates role description updates.[53]

3.47 At the public hearing in February, Defence stated it had commenced development of the strategic workforce plan and it was on schedule as a 'deliverable' for the middle of the year. Ms Skinner, Deputy Secretary of Defence People Group, told the committee:

> [W]e are working to develop workforce plans for each job family in order to drive recruitment, learning and development, performance and talent management, which does go to some of the issues just raised, and to provide career and skilling pathways. Those workforce plans will be informed by a census of the current skills of the Defence/APS workforce against organisational requirements. That census will be undertaken between March and August this year, initially focusing on the First Principles Review, key job families, which are engineering and technical, logistics, project management, procurement and contracting, and strategic and international policy…
>
> [W]e are finalising an engineering technical strategy to support our APS members within that job family. The strategy will articulate a pathway from entry level to senior management for specialists wishing to plan a career in Defence in their field of expertise. Linked to a learning and development framework, it will assist individuals in identifying the skills they need to acquire to advance in the APS. By providing that clearer structure, the strategies will support our ability to develop and retain. Those programs are in their infancy.[54]

3.48 Further, Defence noted that under the FPR 'there is a specific initiative to take a much more programmatic approach to our acquisition and life cycle work into the future rather than just looking at things project by project'. While this had commenced, it was 'in very early stages at the moment'.[55]

---

52 *Submission 28*, pp 7-8.

53 Defence, response to question on notice from the public hearing on 5 February 2016.

54 *Committee Hansard*, 5 February 2016, pp 20, 22.

55 Mr Devlin, Defence, *Committee Hansard*, 5 February 2016, p. 25.

Chapter 4

Maintaining and rebuilding capability

Introduction

4.1 Chapter 4 will cover the remaining terms of reference of the inquiry. In particular, it will consider issues raised relating to:

- recruiting, remuneration, retention and retirement issues;
- training and development;
- links with industry, academia and other public research agencies; and
- outsourcing and contractors.

Recruitment

4.2 Defence stated that it 'continues to place a priority on attracting a highly skilled PSE workforce'. It noted that Defence continues to have a high ratio of applicants to advertised positions:[1]

> Defence remains an attractive PSE employer. Eighty Engineering and Technical job family positions advertised between August 2013 and August 2015 attracted 770 applicants. Similarly, 11 Science and Technology job family positions attracted 178 applications. Interest in Defence PSE positions extends to those entering the jobs market. The Department's engineering-related graduate program received 623 applications for 43 placements in 2015 and 624 applications for 48 placements in 2016. A recruitment campaign targeting Science and Technology PhD graduates attracted 148 applications for 10 positions. The number of applicants is significant given the degree of specialisation Defence sought for each of the positions advertised.[2]

Restrictions on recruitment

4.3 The APS 'recruitment freeze' was identified as having a significant impact on Defence's PSE workforce. However, Ms Skinner from Defence characterised it as a 'restrain in recruitment' rather than a recruitment freeze. She noted that Defence had continued to recruit in areas important to capability and safety and that 'where there has been any requests for technical workforce that are critical to capability, they have always occurred'.[3]

---

1 *Submission 28*, p. 2.

2 *Submission 28*, p. 4.

3 *Committee Hansard*, 5 February 2016, p. 23.

4.4 Nonetheless, the consequences of restrictions on recruitment were highlighted in evidence. For example, Mr Efthymiou from Professionals Australia stated:

> What I have seen over the last 18 months is that an effective staff freeze, because we have not been able to recruit or promote, has a larger effect. The staff freeze that we have had for 18 months was preceded by a previous one in 2011. I am an EL1 with 11 staff and five direct reports. I have had three people leave in the last four months. I have not been able to recruit because I have not been able to advertise…I am replacing experienced staff with staff from a graduate scheme with 18 months of experience. At some point, that has to have an effect. Logic would dictate that we are introducing risk.[4]

4.5 Similarly, Mr Alan Gray and Mr Martin Callinan described the freeze on recruiting graduates that has been in place across Defence for the last several years as 'adding to the difficulties' for DSTG. While they acknowledged that DSTG was 'planning to recruit 20-25 new graduates in 2015-16', they considered this would not cover 'the losses that have occurred within the PSE community over the last several years'.[5]

4.6 Others argued that recruitment restrictions within Defence were increasingly transferring administrative and unrelated other duties onto the Defence PSE workforce. One submitter, who requested to be anonymous, described the focus of technical jobs moving from being less about 'the knowledge to investigate, develop and keep up with the latest technology available, and how to integrate it in support of the ADF' and more about 'ensuring we keep to the travel/training budget':

> These [tasks] include booking your own accommodation and travel arrangements when on course, and trials when support tasking at the various facilities around Australia. Procurement of plant, spares and even contractors. There is a high level of Defence Instructions, complex fiscal instructions and governance with these types of transactions.[6]

Professionalisation

4.7 The AMWU criticised Defence for preoccupation with 'so-called professionalisation' in its PSE workforce approach. This was seen as adversely affecting technical staff recruitment. For example, Mr Hunter stated he had seen 'technical positions lost to "professional" recruits because of the "more bang for bucks" outlook on worker value and the desire to move away from costly hardware facilities toward lower cost software oriented activities'.[7] However, there were also reports that there had been a progressive downgrading of some Defence PSE positions to allow staff without specialist skills to be recruited. Mr Keenan stated:

---

4 *Committee Hansard*, 17 November 2015, pp 24-25.

5 *Submission 16*, p. 6.

6 Name withheld, *Submission 7*, p. 2.

7 *Submission 5*, p. 2.

> Most positions that were dedicated PSE, have been eroded over time because of the inability of management to attract qualified personnel. The protocol that appeared to have been adopted at that time, was to re-write the duty statements into a more generalised nature so that where PSE positions could not be filled, non PSE personnel could apply and successfully fill these positions to maintain Full Time Equivalent (FTE) numbers within the departments.[8]

4.8 There also appeared to be difficulties in recruiting particular specialist Defence PSE positions. For example, Mr Leggatt stated:

> [T]his struggle to retain or employ skilled staff for a specific capability has been demonstrated by the need to conduct a recruitment action for a radiographer 4 times before a suitable candidate was recruited. The candidate that was ultimately selected was selected on the full understanding that they would require training as they, while being the best applicant, were unqualified in industrial radiography.[9]

The broader PSE workforce

4.9 The capacity of Defence to draw employees from a vibrant and active broader PSE sector in Australia was perceived as an important recruitment issue. For example, the Australian Academy of Science (AAS) highlighted the broader challenges in Australia of maintaining a workforce with expertise in science, technology, engineering and mathematics (STEM). It noted that the number of STEM-qualified graduates has declined from 22 per cent of total graduates in 2002 to 16 per cent in 2012. It stated:

> There are particular challenges for defence science. Currently, workers in Australian defence science are predominantly employed by DSTG. Not only do employees of DSTG need to be capable scientists and engineers, but they must also be Australian citizens and able to obtain a relatively high-level security clearance—usually top-secret negative vetting or higher. These requirements considerably restrict the available talent pool.[10]

4.10 The workforce challenges in relation to the PSE workforce were not seen as unique to Defence. For example, the Department of Industry, Innovation and Science (DIIS) highlighted that employees qualified in science, technology, engineering and mathematics (STEM) 'are highly valued employees in a number of diverse workplaces and, given the exponential growth in and demand for technology and innovation, will only remain so'.[11] DIIS outlined an 'increasing need for STEM qualified people will be

8 *Submission 6*, p. 2.

9 *Submission 14*, p. 3.

10 *Submission 9*, p. 5.

11 *Submission 34*, p. 1.

an issue that will need to be managed across the economy, not just in the Defence sector'.[12]

4.11 The DIIS characterised the ability of Defence to have relevant PSE capabilities to meet future technological needs as largely dependent 'on the transferability of skills across the sector and between sectors':

> Recent workforce statistics for Australia highlight that Defence is not the primary workplace for PSE employees. Rather, employment in PSE occupations is concentrated in five industries: manufacturing (15.9 per cent of employees); professional scientific and technical services (12.8 per cent of employees); electricity, gas, water and waste services (15.3 per cent of employees); construction (7.6 per cent of employees); and mining (31.7 percent of employees). These statistics highlight the importance of transferability of skillsets between Defence and other industries.[13]

4.12 The AAS observed that while the science sector as a whole has significant problems regarding gender equity, the defence science sector appears to have exceptionally low levels of employment of women scientists. It noted that 'women make up only 20 per cent of the DSTG workforce'. The AAS argued that, if the gender imbalance in the science workforce was addressed, employers such as DSTG will have access to a larger pool of high-quality scientists from which to recruit.[14]

4.13 Defence made the point that following the resources boom the labour market has eased with 'softer employment conditions and reduced employment growth in the mining, construction and utilities industries alleviating shortages in most related occupations'. It stated:

> While shortages remain in a limited number of related trade and technician occupations, they are likely to ease in the short term. Employment projections suggest demand for the engineering and related technologies qualified population will remain subdued over the next decade, though growth will continue above trend for some advanced engineering and related technologies skills and in information technology related occupations.[15]

Remuneration and retention

4.14 Remuneration and retention issues for the Defence PSE workforce were frequently highlighted. Several submitters noted the comparatively low pay offered by the APS in comparison to the private sector or the ADF. For example, Mr Christensen stated:

---

12 *Submission 34*, p. 4.

13 *Submission 34*, p. 6.

14 *Submission 9*, p. 8.

15 *Submission 28*, pp 8-9.

> The state of payment to APS technical staff within the Department of Defence (DoD) has fallen so far behind their military counterparts that staying in the APS DoD is fast becoming an extremely poor choice of employment.[16]

4.15 Dr Davies highlighted this issue in his evidence to the committee:

> Defence simply has to find a way to engage top quality engineers. One problem, seemingly intractable, is the public service salary levels. The relatively low pay for engineers in Defence has meant that the flow between the public and private sectors has been pretty much one way. Defence's best engineers get better job offers from elsewhere. Surely it is not beyond the wit of man to find a way to pay salaries commensurate with market value. Solving the problem, especially if coupled with the ability to offer contracts over a few years, might make a spell in government an attractive CV addition for top quality engineers looking to move up into senior management positions in the private sector.[17]

4.16 PSE workers currently employed in Defence expressed frustration with the offers to Defence employees as part of the enterprise agreement bargaining process.[18] The Defence Enterprise Collective Agreement (DECA) expired in June 2014 and negotiations for a new agreement under the government's workplace bargaining policy have not concluded. A submission from person who asked for their name to be withheld stated:

> I get really frustrated when as a group, we get numerous amounts of praise for being able, to investigate, improve or modify the vast range of ordinance that is required to support the ADF both here and abroad. But then get informed that we have no integrity when refusing to accept the current miniscule pay increase, along with the substantial reduction in conditions on offer by Defence in the latest DECA negotiations.[19]

4.17 Defence observed that 'retention rates for the engineering and technical, and science and technology, workforce exceed the Defence APS average'.[20] However, Defence acknowledged that 'there is scope to further optimise the existing employment framework, including options for flexible work and where necessary, Building Defence Capability Payments, so Defence best caters for and supports its diverse PSE workforce'.[21] Defence observed that it had a range of options to attract and retain employees with specialist skills:

---

16 *Submission 8*, p. 1.

17 *Committee Hansard*, 5 February 2016, p. 2.

18 For example, Name withheld, *Submission 20*, pp 2-3; AMWU, *Submission 17*, Attachment 1, p. 30.

19 *Submission 7*, p. 1.

20 *Submission 28*, p. 1.

21 *Submission 28*, p. 11.

> For example, broadbands allow for two or more adjacent classifications to be combined into a single, broader classification that allows employees to progressively undertake duties of a higher work value as the employee builds knowledge, skills and experience. To be competitive with market changes in remuneration, the option for management to initiate a Building Defence Capability Payment (BDCP) is available for an individual employee, or for a group of employees in an occupational discipline that is critical to Defence capability.[22]

4.18 However, some of the methods used to retain Defence PSE staff were seen as having unintended consequences. For example, a submitter noted:

> Inability to attract and retain engineering workforce expertise due to major deficiencies in salary. Therefore, many APS engineers are acting in higher level roles (mostly at EL1/EL2 levels) which is then misrepresenting the managerial numbers across the organisation leading to the recent voluntary redundancies (VRs) offers to cull them back.[23]

4.19 It was also highlighted the Defence PSE workforce was not only motivated by monetary considerations. For example, Mr Callinan and Mr Gray noted:

> While wage disparities between the private and public sectors has government scientists, engineers and technologists at a disadvantage, the opportunity to work at the cutting edge of Australia's defence has innate appeal. However, national interest must be combined with cutting edge. Science and Engineering professionals are motivated by discovery and design.[24]

Career paths

4.20 The lack of clear career paths was seen as a major disincentive to both recruitment and retention of PSE specialists. For example, Mr Jonathan Laird stated:

> APS technical career progression does not exist. Period. We badly need technical broadband positions to allow staff to naturally develop and be compensated accordingly. We need additional technical specialist employment streams to be raised (not extinguished).[25]

4.21 Mr Garry Duck, a senior engineer with 29 years of experience, articulated a common view in relation to the retention of engineers in Defence:

> There is no difficulty in attracting inexperienced Graduate engineers (APS4-5).

---

22 *Submission 28*, p. 4.

23 Name withheld, *Submission 20*, p. 2.

24 *Submission 16*, p. 11.

25 *Submission 3*, p. 1.

> There is no difficulty retaining these Graduates for the 3 years or so to develop them into productive and valuable Junior PSE Practitioners (APS6).
>
> Unless there are available APS6 positions it is difficult to retain Engineers past 3 years.
>
> Unless there is a clearly available EL1 opportunity it is difficult to retain Engineers past 5 years.
>
> It is next to impossible to attract highly skilled EL1 and EL2 engineers due to the poor pay rate compared to Industry.
>
> Retention of the EL1 and EL2 PSE workforce is largely influenced by work – life balance considerations and the falling morale level of the remaining senior engineers.[26]

4.22 Dr Klovdahl noted that 'subject matter experts' were frequently unable to progress beyond APS6 without transferring to a management stream. To resolve this situation he advocated that the career paths for talented 'technical experts' with high levels of education and experience should reach to include Senior Executive Service levels.[27]

4.23 The absence of sufficient opportunities for professional development was also highlighted as a problem for the retention of PSE workers. Dr Davies stated:

> Defence does not actually do much engineering in the sense that practitioners of the art would recognise. Instead, it is a customer for engineering expert advice rather than having engineers design and build stuff, which is what they really like to do. That makes it hard for Defence to retain really good engineers…

Building Defence Capability Payments (BDCPs)

4.24 Building Defence Capability Payments are aimed at assisting Defence to develop, attract and retain employees with the required skills, knowledge and experience which are essential to meet Defence capability. However, the AWMU considered that BDCPs had not had widespread application. Mr Nicholaides stated:

> The anecdotes that come back to us are that it is very difficult bureaucratically to get authorisation for it. It is quite a lengthy period and there are blockages in the system, because you are actually paying more money and things are tight.[28]

4.25 Mr Grimm also described access to the BCDP as inconsistent 'even for staff with the same sets of skills'. Further, he became aware that 'the additional salary paid

---

26 *Submission 32*, p. 3.

27 *Submission 33*, p. 2.

28 *Committee Hansard*, 5 February 2016, p. 15.

for the BDCP for some staff had to be offset by a reduction in number of APS positions'.[29]

Retirement and redundancy

4.26 A common view was that a large portion of Defence's PSE workforce was approaching retirement age. Mr Alan Gray and Mr Martin Callinan stated:

> DSTG is in a difficult position as a significant cadre of scientists and engineers recruited in the 1980s and 1990s is reaching retirement age…Indications are that PSE personnel with 20, 30 or 40 years experience have taken advantage of redundancy packages on offer to leave the DSTG workforce.[30]

4.27 Succession planning by Defence was considered insufficient. RINA noted that 'the current environment means that even where staff are replaced, absence of career or succession planning means that there are now more limited opportunities for one generation to pass on their experience and "lessons learnt" to the next generation'.[31]

4.28 The point was repeatedly made that once capability within the Defence PSE workforce is lost can be difficult to replace or rebuild. For example, Mr Keenan commented:

> A critical role a skilled Defence PSE workforce with [reliability, availability and maintainability] training, can deliver is enhancement of through life support for existing and future platforms, in a very cost effective manner. The loss of this important capability may in the short term appear to be a cost saving however, the long term aspect is that once a capability like the PSE is lost, the ability to retrain and rebuild the skills and knowledge can take many years.[32]

4.29 Defence outlined that it had implemented a transition-to-retirement program which 'facilitates the retention of critical knowledge by Defence of retiring staff':

> 62 staff are participating, or have participated, in the transition to retirement initiative. 58 individuals have exited, 24 have completed a 12 month Senior Fellowship and there are 11 current Senior Fellows.[33]

4.30 On 15 November 2015, it was reported that Defence was cutting middle manager numbers by accepting 565 applications for voluntary redundancy. In particular, the executive level workforce was reported to be reduced by 10 per cent as

29 *Submission 23*, p. 4.

30 *Submission 16*, p. 6.

31 *Submission 27*, p. 12.

32 *Submission 6*, p. 1.

33 *Submission 28*, p. 9.

the Defence bureaucracy addressed 'span of control' issues by increasing the number of employees under each of its managers:

> The breakdown of voluntary redundancies from Defence include 214 from the [CASG], 42 from the [DSTG], 29 from the vice-chief of the defence force group, 19 from the air force and five from the navy.
>
> Among those taking redundancies are 60 project managers, 55 engineers, 34 scientists and 40 information technology professionals.[34]

4.31 Witnesses told the committee that the redundancies in Defence were taking away personnel in critical areas of capability development such as submarines and the Joint Strike Fighter.[35] Mr Smith from Professionals Australia considered it was 'almost mind boggling' that Defence was undermining its internal expertise for projects critical to Australia's ongoing defence capability with 'a significant cost to the taxpayer'. As an example, he noted that 'there are at best…three APS civilian engineers with senior expertise in submarine naval architecture':

> SEA 1000 has one senior naval architect from the APS in an organisation that is generally full of contractors. The Collins class sustainment also has one senior naval architect. Both of those senior naval architects have been offered redundancy in a very recent round of executive level redundancies…
>
> We are going from a position where, 10 years ago, we had probably about 95 years worth of experience in naval architecture. We had still not a big group in submarines. There was probably about eight to 10. Five years ago, we had about four or five. If both of these senior engineers take redundancy, we will have no experience and we will have no internal expertise.[36]

4.32 Ms Skinner from Defence highlighted that the separation rates, which measure the percentage of employees who left the organisation, were lower for CASG and DSTG than the average for Defence.[37] In relation to Defence's redundancy program she stated:

> [S]uccessive governments have been concerned about the size of the middle management—that was again raised in the first principles review—and enhancing spans of control and things like that. We have focused our voluntary redundancy program on those levels, but it is primarily focused on what we would call the enabling functions—so not primarily focused on our technical workforce. However, we do consider people in that category

---

34 Phillip Thomson, Defence hands out 500 voluntary redundancies: 1200 put up their hand'[, *Canberra Times*, 15 November 2015, available at http://www.canberratimes.com.au/national/public-service/defence-hands-out-500-voluntary-redundancies-1200-put-up-their-hand-20151113-gky55d.html (accessed 16 November 2015).

35 *Committee Hansard*, 17 November 2015, p. 23.

36 *Committee Hansard*, 17 November 2015, p. 22.

37 *Committee Hansard*, 5 February 2016, p. 20.

> where there might not be organisational fit and where they do not meet organisational requirements. So people were invited to express an interest in a voluntary redundancy. We very carefully went through each individual request. There were around 1,100 requests, and we made around 575 offers. But we kept regard to our critical occupations. We kept regard to people's organisational fit.[38]

4.33 However, others such as Mr Bussell from Professionals Australia described the devastating impact on the organisational culture of DSTG of recent changes to the workforce:

> I have been a member for 34 years. I have never seen the staff in such a state of disillusionment. Our morale is low and decreasing. The confidence we have in our senior management team is decreasing. The trust we have in our senior management team is decreasing. The only thing that is increasing is the number of people that want to leave the organisation. For an organisation that has an historical exit rate, a separation rate, of five per cent, it is now sitting at something like 27 per cent.[39]

Training and development

4.34 An identified problem for Defence engineers was the limited opportunities to undertake practical and on-hands work to develop their expertise. For example, Dr Davies argued that there was a risk that the relatively long-term nature of employment in Defence could mean that parts of the PSE workforce have failed to maintain up-to-date skills and expertise. He argued that Defence needed to make 'a spell in government attractive for an engineer who has extensive experience—probably gained in the private sector, where they get to design and build stuff, but they then go and work for government for a while to bring that expertise into being a smart buyer'.[40]

4.35 In relation to engineering, Dr Davies noted that Defence had outsourced many parts of its engineering requirement to private sector contractors. In practice, Defence engineers spend little of their time engaged in exploratory or research work and instead are helping Defence be a 'smart buyer' of goods and services from the private sector. Dr Davies identified this as a challenge:

> Defence needs experienced and skilled engineers to be a smart buyer, but doesn't offer the same professional opportunities. In effect, Defence engineers have to second guess the work of their private sector counterparts in areas that they have little ongoing exposure to. When dealing with state of the art technologies, currency matters.
>
> One possible way to manage the engineering workforce would be to have lower transitional barriers between Defence and private sector employment,

38 *Committee Hansard*, 5 February 2016, p. 21.

39 *Committee Hansard*, 17 November 2015, p. 24.

40 *Committee Hansard*, 5 February 2016, p. 4.

> so that part of an engineering career could be spent in government service, bringing high level private sector expertise with it. Perhaps the biggest impediment to such movement is the salary differential between private sector and government positions. During the resources boom in particular, it was very much one way traffic in engineers from Defence to the private sector. Today it's probably easier to have a two way flow—the trick will be to make a stay in Defence attractive enough to entice the best engineers.[41]

4.36 Mr Bussell from Professionals Australia stated:

> The issue on smart buyer advice is having the expertise in-house to interpret claims from manufacturers and industry about the performance of their products. Industry does a wonderful job of developing technologies and they also do a wonderful job of marketing those technologies. Unless have you the in-depth detailed expertise to question those marketing claims, you are putting yourself at risk of buying a product that does not perform to a specification that you thought it might. It takes a long time for defence scientists and engineers to develop a degree of expertise that allows them to look through the cracks of those marketing brochures and identify just what is a realistic level of performance for this technology.

4.37 The RINA submission noted:

> The current PSE workforce appears to be highly dissatisfied with the way in which the engineering profession is underutilised and managed. Engineers are by nature practical people, and it is obvious to them that the current arrangements do not economically solve engineering issues, rather they often create more work for them further down the track. Generally there is a lack of morale and a feeling of frustration, including that numerous previous reviews have not led to significant improvements or full implementation of their sensible recommendations.[42]

4.38 There was support for programs to encourage Defence staff with PSE expertise to rotate back to Defence after a period in the private sector or to continue their association with Defence following completion of their service.[43]

4.39 Mr Lovell from Northrop Grumman stressed the need for Defence engineers to have practical experience.

> [A] graduate program that brings an engineer out of university into an organisation like the Capability Acquisition and Sustainment Group is actually bringing in somebody who has never done anything. I believe that the only way an engineer can become effective is by designing and building things. So in an ideal world, what we would prefer, and I think the service

41 *Submission 19*, p. 3.

42 *Submission 27*, p. 8.

43 For example Rear Admiral Doolan, RSL, *Committee Hansard*, 17 November 2015, p. 3.

> would prefer, is to have people on the inside who have done some serious work on the outside.[44]
>
> It's time to change the current policy of attrition and recruit new people to the organisation so that our knowledge, capabilities and research can be carried on into the future. There's still a need for technical people which is largely unmet by the current university and TAFE systems. DSTO in the 50's through to the 90's had the best technical apprentice training facilities in Australia but these were closed in 1993. Two decades on and competent technical people are hard to find so it would be beneficial to consider some sort of Defence apprentice training scheme once more.[45]

4.40 Witnesses from the AMWU highlighted the importance of growing and developing PSE expertise from within Defence. Mr Hunter, a delegate with the AMWU stated:

> Many of our members have started as apprentices, have become technical officers, have gained degrees and have even gone on to get PhDs, et cetera. So there is a progression up. If you buy a technician at the start, you can actually grow that person to become someone who then moves up through the organisation….
>
> The advantage of a long-term relationship with an employee is that they get a deep knowledge of your particular area. Therefore, they can foresee things when they come through and know if something is not going to work. Then they can go back and justify their actions. It is that deep knowledge that we need to retain, but which we are losing at a rapid rate.[46]

4.41 Defence outlined that in 2014-15 it invested approximately $10.6 million and $6.2 million in training the then Defence Materiel and Defence Science and Technology APS workforces.

> These figures capture Defence wide education assistance schemes that enable Defence public servants to study physical science and engineering courses at a range of institutions, while receiving full or partial fee exemptions, or reimbursement and study time release. There is also sponsorship for specific professional development, such as fully funded training and postgraduate professional studies, and support and funding for membership of and certification by professional bodies.[47]

4.42 Ms Skinner outlined Defence's approach to investing in learning and development for the PSE workforce:

> This includes significant investment in education assistance schemes that enable Defence public servants to study physical science and engineering

---

44 Mr Lovell, Northrop Grumman, *Committee Hansard*, 17 November 2015.

45 *Submission 11*, p. 2.

46 *Committee Hansard*, 5 February 2016, p. 13.

47 *Submission 28*, p. 4.

> courses at a range of institutions, while receiving full or partial fee exemptions or reimbursement and study time release. There is also sponsorship for specific professional development, such as fully funded training and postgraduate professional studies, and support and funding for membership and certification by professional bodies. Various training and development initiatives are in place to sustain long-term science and technology capability by attracting new talent and retaining the existing skilled workforce. For example, we do have mobility programs for placing staff with industry, academia and research agencies, PhD studies and graduate transition to retirement retention programs.[48]

4.43 In relation to the opportunities 'for employees to undertake part time and full-time PhD studies' to gain high-level research skills in order to increase long-term Defence Science and Technology capability, Defence outlined there are '13 Leave PhD's and 41 part time PhD's participating in the initiative'.[49]

4.44 However, there appeared to be further scope for staff development with the Defence PSE workforce. The Department of Industry, Innovation and Science observed there were 'noteworthy differences in the PSE qualifications of Defence employees in the public and the private sectors':

> The 2011 Australian Census recorded almost twice as many Defence employees with PSE and information technology qualifications in the private sector as there were in the public sector: 50 per cent and 28 per cent on average, respectively. 11 Additionally, employees in private sector Defence industries achieve a higher level of tertiary education compared to their public counterparts: 47 per cent versus 26 per cent on average, respectively.
>
> There is scope for public sector Defence employees to lift their qualifications and technical expertise to match that of their private sector counterparts. This will help ensure that communication between them, especially in relation to complex defence procurements, is highly efficient and technically sound.[50]

Links with industry, academia and other government agencies

4.45 Many submitters argued there were further opportunities for Defence in closer relationships with centres of PSE expertise in industry, academia and other government agencies. For example, Dr Davies considered it was worth considering 'how innovation in our university sector can be picked up for application in defence when applicable'. Similarly, he identified the 'transition of technologies from

48 *Committee Hansard*, 5 February 2016, p. 21.

49 *Submission 28*, p. 9.

50 *Submission 34*, p. 3.

innovation centres such as [cooperative research centres] to industry [as] fertile ground for inquiry'.[51]

4.46 The AAS also argued that there may be significant opportunities for other research institutions to augment the capability of the defence science establishment. It noted that significant research and development expertise is available in Australia's university sector and suggested that 'utilising it to complement in-house activities could allow Defence to maintain a strong and diverse research program, while working within the constraints of the labour market'.[52] The AAS recommended that Defence and the DSTG expand opportunities for communication and engagement with 'the academic research sector, to assist DSTG's in-house expertise to take advantage of the latest innovations and research'.[53]

4.47 Mr Alan Gray and Mr Martin Callinan argued that 'the decline in a dedicated defence PSE workforce can be mitigated provided Defence is given the tools and the ability to incentivize the broader PSE workforce that exists within Australia's academia, industry and amongst our allies':

> Prudent and sustained investments now in the requisite infrastructure, secure communications links, security clearances and training and funding to allow targeted basic and applied research to be undertaken by Australia's PSE communities resident within Australia's academia will yield returns to Australia defence and well-being for many decades to come. More importantly, a change in mindset is required to allow such a paradigm to occur.[54]

4.48 Mr Gray told the committee that his ASPI paper with Mr Callinan called for 'Defence to establish a human resource model that encourages mobility amongst the defence research and broader Australian PSE community'. He stated:

> The skilled scientists and researchers currently employed are not necessarily the scientists and researchers needed to address the disruptive technologies on the horizon. Consideration also needs to be given to enabling academics and other researchers from other government research agencies and universities to transition employment conditions of both service and superannuation arrangements so that they are not disadvantaged when working on Defence related projects. Security clearances and transfer arrangements for working on Defence projects entails unacceptable delays and impediments in this day and age. Of course, security needs to be maintained, but security measures must not be allowed to impede the employment of talent to tackle the national security challenges.[55]

---

51 *Submission 19*, p. 3.

52 *Submission 9*, p. 6.

53 *Submission 9*, p. 1.

54 *Submission 16*, p. 8.

55 *Committee Hansard*, 17 November 2015, p. 27.

4.49 His submission with Mr Callinan recommended that a 'security clearance and terms and conditions framework fit for purpose in the 21st century needed to support a PSE workforce that moves frequently (eg. 2 -3 years) between our academic sector, industry sector and defence department to allow them to work on defence and national security issues'.[56]

4.50 The Australian Nuclear Science and Technology Organisation (ANSTO) noted that it had a strong record of research collaborations and projects undertaken with Defence. It noted that ANSTO had worked independently as well as in collaboration with DSTO on national security science and technology projects and highlighted ANSTO's unique materials engineering capability, which has proved important in the development of more effective armour for personnel carriers and naval surface ships.[57] It stated:

> ANSTO believes that the optimal solutions for shortages in Defence PSE capabilities will need to take into account other national investments in science and engineering infrastructure as well as the non-defence science and engineering workforce. By utilising the unique capabilities offered through pre-existing national investments in scientific infrastructure and personnel, Defence can more effectively plan and budget to develop new and complementary PSE capabilities. ANSTO represents a good example of the benefits of this approach.[58]

4.51 However, Northrop Grumman was cautious about links outside of Defence. It noted:

> Given the specialised nature of this work, and the fact that there are few relevant applications outside the environment of the Australian Defence Organisation, the scope for crossover between defence research science and commercial industrial science is limited. Whilst historically some institutional relationships have developed between defence science and academic institutions, these relationships have generally developed from either a close organisational relationship in a specific science discipline, or have arisen from a long standing precedent.[59]

4.52 Engagement with the defence science and engineering expertise of our allies was also stressed.

> Having DSG tied into US military research organisations like DARPA and some of the think tanks such as Jet Propulsion Laboratory and Los Alamos laboratories et cetera enables them to assess what else is happening. Are we on our own with a particular problem?[60]

---

56 *Submission 16,* p. 12.

57 *Submission 29*, p. 1.

58 *Submission 29*, p. 2.

59 *Submission 26*, p. 3.

60 Mr Lovell, Northrop Grumman, *Committee Hansard*, 17 November 2015, p. 9.

4.53 While the FPR concluded that, while wholesale outsourcing of DSTG function would not be wise, there were opportunities for increasingly linking its work to the broader scientific community, particularly in industry and academia:

> We recommend that strong partnerships be established with key academic and research institutions to leverage the knowledge of scientists and create pathways into and out of academia and industry…
>
> The Chief Defence Scientist should examine the methodology utilised to prioritise blue sky research versus the applied research program. The Defence Science and Technology Organisation has a niche role to play in a much larger global scientific research program and it is vital that its blue sky research focuses on matters of special relevance to Australia.
>
> We recommend that Defence, in partnership with academia and industry, review its developmental research priorities, their alignment with future force requirements and capacity to leverage allied partners, in order to promote innovation and make the most valuable contribution to future Defence capability.[61]

4.54 However, Dr Zelinsky, the Chief Defence Scientist, described DSTG as 'probably the best engaged public research agency with the university sector'. He stated:

> Last September [DSTG] won the Creative Engagement Strategy Award from Knowledge Commercialisation Australasia, the peak body supporting research commercialisation and transfer of technology, for our engagement with universities. We have struck an agreement with 28 universities that is quite novel. It allows us now to conduct work where, instead of taking 86 days on average to strike an agreement, it is now down to 38. The amount of money we are investing with the universities has moved from $12 million to $16 million per annum, just in that 12 months.[62]

4.55 The ANAO's report outlined DSTG's links with other public research orgnaisations:

> DSTG has established strategic relationship agreements with several publicly funded research entities—the Commonwealth Scientific and Industrial Research Organisation (CSIRO) in June 2013, the Australian Nuclear Science and Technology Organisation (ANSTO) in 2006, and the Bureau of Meteorology (BOM) in August 2013. These strategic relationship agreements involve sharing resources, personnel and facilities to perform collaborative projects and are overseen by a senior steering committee. To date, DSTG has undertaken a number of joint research projects with CSIRO and ANSTO, exchanged staff with CSIRO through a secondment program,

61 FPR, p. 42 [emphasis in original].

62 *Committee Hansard*, 5 February 2016, p. 30.

> developed training programs with ANSTO, and conducted forums with BOM.[63]

4.56 As part of its submission Defence noted that the DSTO (now DSTG) in recent years 'has been active in building partnerships across industry and academia'. It outlined:

> This includes a framework agreement signed with Northrop Grumman Australia in March 2014. The results of research undertaken at centres such as the Defence Science Institute in Melbourne and the Centre of Expertise in Energetic Materials in Adelaide demonstrate the value which is being realised from these partnerships.[64]

4.57 Defence stated it was 'continuing to build and leverage relationships with Australian universities and external organisations, which provide access to centres of technical specialisation'. It noted that in 2015-16 Defence provided $14.2 million to seven organisations to develop and demonstrate technologies to enhance defence technology.[65]

Outsourcing and contractors

4.58 Defence observed that it 'does not outsource projects, but draws on "contractor support" for elements of project management'. It outlined:

> Integrated support contracts are used to outsource one or more project-related functions, but not complete control or management of a project, nor core functions that Defence should retain. Functions that can be outsourced include the transactional elements of commercial, finance or integrated logistics support, as well as project administrative support and engineering services.[66]

4.59 Defence argued that '[d]rawing on the private sector to augment Defence's in-house capabilities has always been essential to enable the Department to deliver its core outputs effectively and efficiently'. However it noted that Defence 'has always, and will continue to, prioritise retaining sufficient PSE expertise in-house to meet its responsibilities to Government'.[67] The Defence Portfolio Budget Statement indicated that there were 352 contractors employed by Defence in 2014-15 with an estimated increase to 484 in 2015-16.[68]

---

63 ANAO, 'Managing Science and Technology Work for Defence – Defence Science and Technology Group', *ANAO Report No. 19 2015-16*, p. 15.

64 *Submission 26*, p. 4.

65 *Submission 28*, p. 4.

66 *Submission 28*, p. 11.

67 *Submission 28*, p. 11.

68 Defence Portfolio, Portfolio Budget Statement 2015-16, p. 25.

4.60 Nonetheless, outsourcing and the use of contractors was seen as a significant potential risk to the capabilities of Defence's PSE workforce. For example, Mr Nicholaides from the AMWU stated:

> To set the context, you have to plan the department around peacetime and be ready in case of national emergency. The risk is that you can outsource some things in peacetime that you may need in times of national emergency. You run the risk of getting that balance wrong.[69]

4.61 A key concern with outsourcing the Defence PSE workforce was the loss of skills and intellectual property to Defence.[70] The AMWU highlighted that a Deloitte study of the engineering and technical workforce had included feedback which 'frequently identified increased contracting out of engineering and technical work as a key reason for the loss of skills within the APS engineering and technical job family workforce'.[71] Mr Keenan made a related point:

> The current trend in outsourcing also reduces Defences ownership of any skills and knowledge gained (the Intellectual Property), which is currently retained by non defence organisations (outsourced). The long term effects of this process would increased future budgets for Defence and limit the ability of Defence to control future costs, where I have no doubt there would be an impact on Defences ability to provide state of the art platforms and equipment to meet the Government of the day's commitment due to cost blow out.[72]

4.62 However many submissions identified the outsourcing of Defence PSE capabilities as an area of concern. For example, RINA noted a number of concerns with outsourcing projects to defence industry partners. It considered the outsourcing of many previous internal Defence positions and the commercialisation of naval dockyards had exacerbated the loss of relevant experiential/development positions and suitable competent PSE staff within Defence.[73] It stated:

> Project outsourcing may lead to the perception that the more attractive/interesting jobs are outsourced, thus leading to a reduction in the motivation for PSE staff to stay. It is a serious problem if Defence PSE personnel are not getting the experience of either undertaking the contracted work or managing the contracts.
>
> Skills may be built up by the external contractors, but these skills may then not be available to Defence as and when required – they may be committed to non-Defence projects or otherwise unavailable. Furthermore, Defence cannot control the skills available from the marketplace when outsourcing

69 *Committee Hansard*, 5 February 2016, p. 19.

70 For example, Mr Mark Keenan, *Submission 6*, p. 5.

71 *Submission 17*, p. 6.

72 *Submission 6*, p. 3.

73 *Submission 27*, p. 8.

> tasks; it has to either accept whatever is available or undertake the task internally, if it has still retained the capability to do so.[74]

4.63 Outsourcing was also characterised as inappropriate for some areas. For example, it was noted that the absence of in-house Defence PSE capabilities could inhibit government-to-government transfers of defence technology and cooperation due to sensitive security considerations.[75]

4.64 The efficiency and cost-effectiveness of outsourcing or using contractors was also questioned. It was noted that outsourced or contracted PSE work was frequently undertaken by ex-Defence personnel paid at higher rates. Mr Weaven described how his branch had six different Non Destructive Inspection (NDI) contractors within a ten year period. He observed that the time 'spent re-training each new contractor for our specific requirements was a considerable loss of investment, because each one invariably left as soon as more permanent opportunities were offered elsewhere and took with them the extra skills and knowledge they had gained'.[76]

4.65 Integrated Project Management recommended that greater use be made of reservists with PSE and project management skills rather than outside consultants. It argued that advantages of using reservists (including reduced cost, improved flexibility, military background and the importation of private sector experience) accorded with the recommendations of the FPR that Defence ensure that 'committed people with the right skills are in appropriate jobs'. Integrated Project Management observed:

> Contractors, when hired as Project Managers, can charge $1300 to $1500 per day, or $330,000 to $530,000 per year. A Reservist employed as the project manager, say, of Major rank, would cost the pay scale for that rank, approx $300 per day, or $78,000 for a 5-day-per-week-52-week year.[77]

4.66 In an environment where more work is contracted out, and overseas suppliers are utilised, the importance of maintaining an adequate quality assurance (QA) technical workforce within Defence was also emphasised. Ms Tracey Davis stated:

> The First Principles Review has recommended the contracting out of more work. It is essential that QA staff who ensure Defence materiel is delivered in compliance with our contracts be excluded from the effects of this recommendation. Defence cannot delegate its responsibility to ensure the safety of our ADF men and women…[78]

---

74 *Submission 27*, p. 13.

75 For example, Mr Nicholaides, AMWU, *Committee Hansard*, 5 February 2016, p. 19.

76 *Submission 10*, p. 2.

77 *Submission 24*, p. 8.

78 *Submission 12*, p. 2.

4.67 Professionals Australia also considered that, if the Australian Government wished to maintain Australia's position and technological edge, it needed 'to stop focussing on outsourcing or merging capability, and start focusing on strengthening it, improving integration and engaging the science and engineering workforce'. It was aware of 'other examples where outsourcing or partial outsourcing of engineering support for acquisition or sustainment has led to inefficiencies, added bureaucracy, delays and blurred accountabilities for multi-billion dollar programs'. Additionally, it was concerned that critical science and engineering restructures are being determined by contractors that have a conflict of interest in proposing structures that may, or may not, lead to further outsourcing of engineering functions.[79]

4.68 Professionals Australia recommended the Australian Government 'review all existing contracts for engineering services to identify what can be delivered more effectively in-house, what is required to maintain sovereignty of professional expertise and to ensure Defence is a smart customer in both acquisition and sustainment activities'.[80]

4.69 In contrast, Northrop Grumman had a more favourable view of outsourcing certain PSE capabilities. It stated:

> While there is justification to maintain an in-house capability in defence science and research within the Defence Science and Technology Group, there seems no compelling reason to maintain a specialised engineering capability as these skills generally exist across the Australian industrial base. Instead, the Australian Defence Organisation, including the Defence Science and Technology Group, should seek to buy-in these specialised engineering skills from the Australian industrial marketplace.[81]

4.70 At the November hearing, Mr Lovell from Northrop Grumman differentiated the specific engineering expertise to complete tasks that Defence would always need to have 'in-house' with others which could utilise the expertise of large international Defence companies. He argued that industry has 'a distinct advantage, particularly when you are talking about the globalised companies, at the architectural level'.

> [W]here industry starts getting involved in the science side is really to work with governments, particularly DSG, in taking promising research that really may lead to new capabilities or new products, because industry really has more horsepower to do this sort of thing. So when you are talking about product development, you are really talking about engineering.
>
> what we need, as far as looking at the whole of defence capability, is CASG, the former DSTO, to really have the technical expertise to be a smart buyer, to actually understand the art of the possible, not try to build it. Go back to the predecessor organisations of CASG…[W]hat we really need

79 *Submission 25*, p. 9.

80 *Submission 25*, p. 11.

81 *Submission 26*, p. 5.

> from CASG is enough knowledge to be a smart buyer and a smart sustainer of equipment.[82]

4.71 There were a variety of views expressed on whether any of the functions of the DSTG could be outsourced. The FPR considered that there was 'no clear case for outsourcing the Defence Science and Technology Organisation and, in fact, this approach may be detrimental to the support it offers to Defence and its other customers'.[83] Similarly, Professor David Field from AAS noted that DSTG was 'a very unique environment' and that the 'nature of the work that gets done means that some of it is not easily outsourced'. This required maintaining an in-house capability to deal with unexpected situations.[84]

4.72 However, Dr Davies identified that parts of DSTG's work 'at the research end of the spectrum' could be undertaken outside of Defence. He stated:

> The [DSTG] has actively resisted any notion of outsourcing defence science, often citing security concerns and/or the need to protect allied science and technology. As a result we have ended up with what I think is an organisation that is mostly fair to good with outposts of excellence. That is not good enough in a scientific organisation….The Pentagon makes good use of the many fine research schools in the United States including, incidentally, on some highly classified and sensitive activities. Defence does not need to own all of its researchers. In fact, I would argue that the public service tenured employment model is often an impediment to workforce agility and to the ability to apply appropriate resources to new problems and emerging technology.[85]

82 Mr Lovell, Northrop Grumman, *Committee Hansard*, 17 November 2015, p. 8.

83 FPR, p. 42.

84 *Committee Hansard*, 17 November 2015, p. 12.

85 *Committee Hansard*, 5 February 2016, pp 1-2.

Chapter 5

Committee view and recommendations

Introduction

5.1 In recent years, the Department of Defence (Defence) has experienced a period of considerable uncertainty with a number of ministers with short tenures. This uncertainty has been exacerbated by government decisions to reduce the number of Defence civilian personnel, restrictions on recruitment, significant departmental restructures and uncertainty regarding major acquisition decisions. In particular, the relatively rapid tempo of Defence white papers processes (2009, 2013 and now 2016) has produced a series of overlapping policy directions. During this time Defence has also been conducting overseas operations including in Afghanistan and Iraq, as well as supporting domestic and international disaster relief operations (most recently to assist recovery following Cyclone Winston in Fiji).

5.2 In this frenetic environment, it is understandable that a clear focus could be lost in relation to longer term issues such as maintaining the physical science and engineering (PSE) capabilities of the Defence workforce. However, a series of reviews and reports over the last decade have delivered similar messages to Defence regarding the risks of a decline in its PSE workforce capabilities. This is a significant issue for Defence which has been developing for some time.

5.3 As highlighted in the committee's 2012 report into defence procurement practices, current situation cannot solely be attributed to on-going organisational reform or operational commitments. It is also a consequence of procurement policies which—since the mid 1990s—have increasingly outsourced services such as engineering support and increased the percentage of 'off-the-shelf' acquisition options exercised on a project by project basis.

5.4 Despite the number of reviews which have highlighted problems with the Defence management of PSE workforce, there have been no structural changes to procurement processes which take into account the contribution to defence capability made by suitable levels of competence and capacity in PSE staff across defence and industry from a whole-of-program perspective. There is a risk this cycle of down-skilling has become self-perpetuating with less staff within Defence having a suitable combination of qualifications and experience to act as the 'smart buyer' to identify and manage risk, leading to further 'off-the-shelf' acquisitions and an increasing reliance on our allies.

5.5 The First Principles Review (FPR) report noted that Defence has been subject to a large number of recent reviews of its operations. It stated that the 'sheer frequency of reviews over the past decade has meant that many were short-lived or simply

overtaken by the next review'. A consequence of this was that recommended changes 'were not allowed to bed in before another review began'.[1] Conscious of this state of affairs, the committee has targeted its recommendations in the context of Defence's existing obligations to 'bed in' the recommendations of the FPR report and the policy directions set by the Defence White Paper 2016.

5.6 The committee has been pleased to see that some of the concerns raised during the inquiry have been addressed in the Defence White Paper. However, it has been difficult for the committee to reconcile Defence's assurances that its PSE workforce 'is capable, meets the Government's requirements and is well placed to meet future challenges' with the other evidence received during the inquiry. This evidence included:

- the findings of previous reviews highlighting on-going issues, particularly with regard to the capabilities of the Defence engineering workforce;
- the declining capability to the Defence PSE workforce due to staffing reductions, recruitment restrictions and lack of workforce planning;
- reports of difficulties recruiting some specialist technical positions;
- redundancies offered and taken up by specialist PSE personnel in areas of major future acquisitions;
- descriptions of low morale in areas of the Defence PSE workforce; and
- an increasing reliance on contractors to undertake PSE responsibilities.

5.7 The committee has made recommendations in a number of key areas in relation to Defence's PSE workforce. These include:

- a commitment to maintain PSE capabilities in workforce planning;
- a strategic approach to PSE workforce professional development;
- examining a more flexible PSE workforce model;
- a commitment to keeping Defence science separate; and
- a review to facilitate collaboration in the PSE sector.

A commitment to maintain Defence's PSE workforce capabilities

5.8 The committee welcomes the Defence White Paper's focus on innovation and development of new technological capabilities for Defence. However, the committee notes that further burdens appear to have been placed on the Defence PSE workforce. The Defence White Paper provides for a Defence workforce of 18,200 (FTE) down from 22,300 in 2012. It also provides for 800 new APS positions in 'intelligence, space and cyber security capabilities' and 400 new positions in 'information technology support, simulation, support to Navy engineering and logistics, security,

1 FPR, p. 13.

force design and analysis, and strategic and international policy, including civilian policy officers posted overseas'. It notes that:

> These new APS positions in areas of high priority will be offset by ongoing reductions elsewhere in the APS workforce, including through the reform of service delivery areas of Defence's business, as part of the implementation of the Government's First Principles Review.[2]

5.9 Defence appears to have been given objectives which include reducing its workforce head count while increasing its engineering and scientific capabilities. This approach does not necessarily accord with the recommendation of the FPR that 'the focus on public service reductions as the primary efficiency mechanism for Defence cease'.[3] The committee does not agree that a strict staffing cap approach is the appropriate framework for decision-making regarding Defence's PSE workforce capabilities. The Defence White Paper's focus on innovation and new capabilities strengthens the case for the maintenance and development of an effective in-house Defence PSE workforce.

5.10 However, the committee received evidence that some Defence PSE workforce capabilities had been significantly reduced through lack of recruitment, a lack of investment in skills development and a lack of succession planning for those leaving Defence. A key concern is that Defence, in responding to a series of repeated efficiency measures from government, has permitted its in-house PSE capabilities to decline to critical levels.

5.11 In its review of the *Defence Annual Report 2013-14* the Defence Sub-Committee of the Joint Standing Committee on Foreign Affairs, Defence and Trade questioned whether Defence's job family approach was 'adequate for delivering people with the right skills to successfully undertake certain jobs and noted that there was a shortfall in people with task-specific competence'. It recommended that the 'Jobs Families Project be further developed to incorporate accurate assessments of both qualifications and experience that are required for a given role' and that 'Defence, in its implementation of the FPR 'develop its strategic planning and appointment process to ensure employees have task-specific competence for their role, and that opportunities are actively created for personnel to obtain this relevant experience'.[4]

5.12 The committee also questions whether the current 'job families' approach to workforce planning for the Defence PSE workforce. This issue seems particularly relevant to getting the right people into positions which require specialist skills, qualifications and professional experience in the areas of science, technology and engineering. While the FPR recommended Defence build a strategic workforce plan based on 'job families' there appears to be an ongoing risk that personnel with similar

---

2 Defence White Paper 2016, p. 150.

3 FPR, p. 67.

4 Defence Sub-Committee of the Joint Standing Committee on Foreign Affairs, Defence and Trade, *Review of the Defence Annual Report 2013-14*, 2015, pp 16, 25.

backgrounds will be inaccurately categorised into broad groups. There also appears to be an insufficient emphasis in the 'job families' approach on assessing the previous professional experience required for a person to fill certain specialised and technical positions within Defence. The committee endorses the Defence Sub-Committee's finding and recommendation on this issue.

5.13 The committee is concerned at the extensive focus on 'job families' as opposed to competence (task specific qualifications and experience). A 'job-families' framework may be suitable for many management and administrative roles within a large organisation but it appears inadequate for many engineering or technical appointments that require knowledge and experience specific to the task. The relatively functional nature of Defence aerospace engineering is in some measure linked to the fact that the Director General of Technical Airworthiness (DGTA) has retained the right to grant, grant-with-conditions or refuse delegated engineering authority to officers regardless of their notional suitability for the role as determined by their job family. In the view of the committee this regulatory approach should be adopted more broadly within the Defence procurement and sustainment workforce with a nominated regulator to assess the competencies required in the role and the suitability of any given candidate to fill it.

5.14 The Defence White Paper 2016 has outlined an ambitious program of investment and major procurement. In this context, the committee is concerned that the mistakes of the past may be repeated. Having an experienced PSE workforce within Defence will be critical to ensuring that major strategic purchases are a success. Further, the gradual erosion of the technical and quality assurance PSE staff within Defence appears to be a skills gap which needs to be addressed.

5.15 In the view of the committee, following the completion of the workforce planning strategies arising from the FPR, Defence should identify critical areas in these two key parts of the Defence PSE workforce. Firstly, Defence needs to be effective at specifying its requirements and be capable of being a 'smart buyer'. Secondly, it must be a technically proficient owner and sustainer of its materiel. Defence should clearly articulate that it will recruit, retain and develop staff in these two areas of critical Defence PSE capability regardless of any broad FTE staffing target. In areas of Defence where critical specialist PSE skills are required, managers should be able to focus on recruiting and keeping the 'right staff' rather than just the 'right number' of staff.

Recommendation 1

5.16 The committee recommends that the Department of Defence commit to maintaining its physical science and engineering workforce capabilities in key areas to allow it to be both a 'smart buyer' and a technically proficient owner of materiel.

Recommendation 2

5.17 The committee recommends that the Department of Defence create a role, with appropriate subject matter expertise, analogous to the Director General of Technical Airworthiness, as a regulator to assess the competencies required for specific procurement and sustainment positions and the suitability of candidates to meet those competencies.

A strategic approach to PSE workforce professional development

5.18 Defence must ensure that it has sufficient flexibility in its workforce planning approaches so that its personnel not only possess the required qualifications, but also have the appropriate professional experience to undertake the tasks they are required to perform. Defence should be proactively seeking to create opportunities for its PSE workforce for competency development through its procurement and sustainment programs and other relationships. The current Integrated Investment Program does not appear to clearly link PSE workforce capabilities with major Defence acquisitions and sustainment decisions.

5.19 The new Defence Industry Policy Statement includes the creation of a Sovereign Industrial Capability Assessment Framework to improve the identification and management of the sovereign industrial capabilities that develop and support ADF capabilities. This framework will be collaboratively developed by Defence and the Centre for Defence Industry Capability (CDIC) and inform the Defence Industry Capability Plan which will identify the sovereign industrial capabilities that are required to be maintained and supported in Australia.[5]

5.20 The committee considers there are opportunities in this process for Defence to strategically develop the skills, expertise and experience of its PSE personnel within its relationships with the broader defence industry. The Sovereign Industrial Capability Assessment Framework that forensically examines the sovereign need for industry qualifications and skills should also be applied to Defence PSE workforce.

5.21 This process should directly impact on procurement decisions so as to use acquisition and support contracts to maintain the required level of competence in Australia's workforce spanning both industry and defence. As an extension to this, the Defence Industry Capability Plan and Defence Workforce Plan should be coordinated to facilitate PSE workforce movement between Defence and industry to foster expertise and 'hands-on' practical experience. This could be via a posting cycle or involve discharge and re-engagement with Defence after a period within industry. Either option would see Defence enhance its ability to meet the FPR directive to develop a workforce with the expertise to be a smart-buyer, making well-informed procurement and sustainment decisions.

5 Defence Industry Policy Statement 2016, p. 23.

5.22 The Defence Industry Capability Plan should facilitate PSE workforce movement between Defence and industry to foster expertise and 'hands-on' practical experience. For example, this approach should provide opportunities for Defence PSE personnel to gain experience with prime contractors to enable them to return to Defence with the expertise to make well-informed procurement and sustainment decisions.

Recommendation 3

5.23 The committee recommends that the Department of Defence take a strategic approach to the professional development of its physical science and engineering workforce as part of the Defence Industry Capability Plan.

A more flexible PSE workforce model

5.24 One recent area of reform for Defence has been on delivering a flexible 'total workforce model' with an increased range of full-time and part-time service categories and options for permanent and reserve ADF personnel. Project Suakin has been aimed at enhancing the opportunities for ADF members to serve as their circumstances change across their working life.[6]

5.25 The committee considers there may be opportunities for similar reforms in relation to the Defence PSE workforce. The need for more flexible arrangements to allow personnel with relevant scientific and engineering expertise to move out of Defence, gain experience in the private sector, and then return was highlighted during the inquiry. The importance of fostering junior Defence PSE personnel to develop their qualifications and training was also stressed. Many also highlighted the absence of clear career paths for some categories of PSE Defence personnel and a lack of succession planning as an ageing workforce nears retirement.

5.26 These interlinked and overlapping workforce issues suggest a complement to Project Suakin should be considered. The committee recommends that Defence consider reforms to provide enhanced workforce arrangements to the existing PSE workforce. The focus should be on establishing an employment framework that encourages mobility amongst academia and the broader research community as well as the defence industry. Creating a framework of incentives for skilled personnel to join and stay with the department should also be a priority.

Recommendation 4

5.27 The committee recommends that the Department of Defence undertake an assessment of workforce models to encourage more flexible and attractive arrangements for its critical physical science and engineering workforce.

6 Project Suakin, available at: http://www.defence.gov.au/suakin/ (accessed 26 February 2016).

Keeping Defence science and technology separate

5.28 While the Australian Government did not agree with the recommendation of the FPR that the then DSTO become part of the new CASG, it did not completely close off this proposal. The Defence White Paper also indicated that the Australian Government 'will further consider this recommendation'.[7] Rather than leave this issue unresolved, the Australian Government should clarify that it does not intend to proceed with this recommendation in the future.

5.29 There are both practical and symbolic benefits to maintaining a clearly separate identity for the science and technology group within Defence. Evidence during the inquiry highlighted the potential problems if DSTG was overly focused on its role in providing technical risk assessments and operational support to the detriment of its other responsibilities and functions.[8] For example, Dr Davies from ASPI identified a risk that 'tasking Defence science with becoming a technical advisor will detract from its core defence research effort'.[9] This risk would be further exacerbated if DSTG were integrated within CASG.

5.30 In the view of the committee, DSTG should not be the prime agency responsible for technical risk assessments (given the engineering and certification nature of much of such work) but rather be tasked to providing advice on specific technologies which may the subject of a technical risk assessment being undertaken by Defence. The Defence Test and Evaluation Organisation would be a more appropriate agency to conduct risk assessments, coordinating input from suitably qualified and experienced engineers, operational staff and scientists as required.

5.31 DSTG's PSE workforce has an established position within the Australian research community, together with an international profile. This recognised position has been highlighted in the research leadership role for DSTG outlined in the Defence White Paper including through the Next Generation Technologies Fund. This will invest $730 million to 2025-26 'to better position Defence to respond to strategic challenges and develop the next generation of game-changing capabilities'.[10] In this context, maintaining a separate identity and a clear delineation of responsibilities for DSTG is preferable.

Recommendation 5

5.32 The committee recommends that the Australian Government clarify that the Defence Science and Technology Group will not be integrated into the Capability, Sustainable and Acquisition Group.

---

7 Defence White Paper 2016, p. 166.

8 For example, Mr Callinan and Mr Gray, *Submission 16*, pp 12-13.

9 *Submission 19*, p. 2.

10 Defence White Paper 2016, p. 112; Defence Industry Policy Statement, p. 32.

Recommendation 6

5.33 The committee recommends that the Department of Defence ensure that the roles and responsibilities of the Defence Science and Technology Group are directed to its areas of competence, rather than to technical risk assessments.

Facilitating collaboration

5.34 Some contributors to the inquiry recommended Australia examine the advantages of a counterpart to the US Defence Advanced Research Projects Agency (DARPA). The Defence White Paper's establishment of a virtual Defence Innovation Hub and the Next Generation Technologies Fund to be led by DSTG appears to be a move in this direction. However, the committee notes that DARPA has a number of specific characteristics which allow it to be both flexible in its approach to innovation and disciplined in its focus on pragmatically useful research.

5.35 The evidence received during the inquiry repeatedly highlighted the opportunities for better collaboration between DSTG, publicly funded research organisations, academia and industry. The committee is pleased these particular issues have been picked up in the Defence White Paper, including through the 'new virtual Defence Innovation Hub, with funding of around $640 million across the decade to 2025–26':

> The Hub will enhance the ability of Defence, the Commonwealth Scientific and Industrial Research Organisation, academia and key industry partners to work collaboratively to accelerate the transfer of innovative technologies into Defence capability. The Hub will be managed by Defence to focus innovation activities on priority capability development requirements, some of which require high levels of security classification.[11]

5.36 There was evidence during the inquiry that relevant employment frameworks, and other conditions such as security clearances, could be a significant obstacle to cooperation and involvement in defence projects by academia and industry. In particular, Mr Callinan and Mr Gray made the point that Australia's allies are more advanced in the processes and infrastructure to facilitate contributors from outside the defence organisation to 'enable them to divide their time between working on their day jobs and working in secure environments to the benefit of their nation's security'.[12] In the view of the committee, Defence should assess if it can do better at facilitating collaboration as these new initiatives are established.

Recommendation 7

5.37 The committee recommends that the Department of Defence, in establishing the Defence Innovation Hub and the Next Generation Technology Fund review the obstacles to public research agencies, academia and industry personnel participating in research and development initiatives.

---

11 Defence White Paper 2016, p. 112.

12 *Submission 16*, p. 7.

Senator Alex Gallacher
Chair

Senator David Fawcett

Appendix 1

Submissions

1	Mr Edward Bushell
2	Mr John Pozza
3	Mr Jonathan Laird
4	Returned & Services League of Australia
5	Mr Peter Hunter
6	Mr Mark Keenan
7	Name Withheld
8	Mr Edmond Christien
9	Australian Academy of Science
10	Mr Don Weaven
11	Mr Geoff Day
12	Ms Tracey Davis
13	A/Professor John Binn and Professor John Norris
14	Mr Peter Leggatt
15	Mr Bill Amor
16	Mr Martin Callinan and Mr Alan Gray
17	Australian Manufacturing Workers' Union
18	Dr Peter Eichinger
19	Dr Andrew Davies, Australian Strategic Policy Institute
20	Name Withheld
21	Mr Philip White
22	Name Withheld
23	Mr Martin Grimm

24 Integrated Project Management

25 Professionals Australia

26 Northrop Grumman Australia

27 The Royal Institution of Naval Architects

28 Department of Defence

29 Australian Nuclear Science and Technology Organisation

30 Mr Russell Lund

31 Mr David Sambell

32 Mr Garry Duck

33 Dr Alden Klovdahl

34 Department of Industry, Innovation and Science

Appendix 2

Additional information

Answers to Questions on Notice

1 ANSTO – Answers to questions on notice from public hearing held on 5 February 2016, (received 19 February 2016)

2 Department of Defence – Answers to written questions on notice from public hearing 5 February 2016, (received 16 March 2016)

3 Department of Defence – Answers to written questions on notice from public hearing 5 February 2016, (received 1 April 2016)

Appendix 3

Public Hearings and witnesses

Tuesday 17 November 2015

Returned and Services League of Australia

RADM Ken Doolan AO (Retd), National President

Northrop Grumman Australia

Mr Mike Lovell AM, Director, Operations and Integration

Australian Academy of Science

Professor Les Field, Secretary of Science Policy

The Royal Institute of Naval Architects

Dr Tony Armstrong, President

Mr Rob Gehling, Secretary

Professionals Australia

Mr David Smith, Executive Officer, Australian Government Group

Mr Tim Bussell, Defence Scientist and Professionals Australia member

Mr Tim Efthymiou, Senior Engineer and Professionals Australia member

Mr Alan Gray, private capacity

Friday, 5 February 2016

Australian Strategic Policy Institute

Dr Andrew Davies, Director of Research

Australian Nuclear Science and technology Organisation

Dr Greg Storr, Group Executive, Nuclear Science and Technology

Mr Steven McIntosh, Senior Manager, Government and International Affairs

Australian Manufacturing Workers' Union

Mr Mike Nicolaides, Assistant National Secretary

Ms Tracey Davis, Delegate, Capability and Acquisitions Group

Mr Peter Hunter, Delegate, Delegate

Department of Defence

Dr Alex Zelinsky, Chief Defence Scientist, DSTG

Mr Mark Devlin, Chief Engineer, CASG

RADM Michael Uzzell, Head Navy Engineering, Royal Australian Navy

Ms Rebecca Skinner, Deputy Secretary, Defence People Group (DPG)

Ms Justine Greig, FAS, People Policy Culture and Development, DPG

Mr John Geering, Director General, People, Policy and Employment Conditions, DPG