

# Chapter 6

## Research, industry and procurement

### Introduction

6.1 This chapter will consider Australia's defence research and development capabilities and industrial expertise in relation to unmanned platforms. It will also examine issues with acquisition and procurement of unmanned platforms by the ADF.

### Research and development

6.2 The importance of research and development to ADF use of unmanned platforms was repeatedly stressed during the inquiry. Defence emphasised that research and development 'influences every aspect of unmanned platforms including roles, cost, mission effectiveness, force structure, risk, policy, public confidence and safety'.<sup>1</sup> Australia has had a continuing role in global UAV research and development. For example, in February 2014, it was reported that the UK Ministry of Defence conducted test flights of its Taranis Unmanned Combat Air Vehicle at the Woomera Prohibited Area in South Australia.<sup>2</sup> Defence commented:

The rather sparse population density and low air traffic volumes seen in Australia provide an ideal environment for testing UAS. The Royal Australian Air Force (RAAF) Woomera Test Range in particular has provided an established facility that has already been used by local and overseas agencies to test UAS...<sup>3</sup>

6.3 A number of submissions highlighted niche unmanned platform research and development activities being undertaken in Australia. Many universities in Australia (University of Sydney, Royal Melbourne Institute of Technology, Queensland University of Technology) have active research and development programs. The Australian Research Centre for Aerospace Automation (ARCAA) is a collaborative UAV research organisation established between Queensland University of Technology and Australian industry. The CSIRO has also been working with private companies, including in developing mining autonomy research and development.

6.4 Defence observed that '[a]cademia, when unified through public and private funded cooperative research centres, has achieved significant successes in unmanned systems'. It noted that the Australian Centre for Field Robotics (ACFR) at University of Sydney is recognised as a world-leader in Simultaneous Location and Mapping, a

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1 *Submission 23*, p. 14.

2 Matthew Grimson and Mark Corcoran, 'Taranis drone: Britains's \$336m supersonic unmanned aircraft launched over Woomera', *ABC News*, 7 February 2014.

3 *Submission 23*, p. 14.

technology used to allow an unmanned platform to know where it is in the world and map its environment without the use of a GPS receiver.<sup>4</sup>

6.5 Saab Australia told the committee it had established a research centre focused on USVs in South Australia:

The Australian Centre of Excellence in Autonomous Surface Vessels seeks to harness the skills developed in Saab in support of the RAN surface fleet and leverage the sophisticated unmanned platform technology developed in Saab worldwide to provide an incubator for the development of novel applications for unmanned surface platforms.<sup>5</sup>

6.6 The challenges of bringing together research and development resources from the academic, industry and defence sectors were also emphasised.<sup>6</sup> Defence noted the Defence Science and Technology Organisation was a key 'industry/academia partner and the lead agency for innovation integration across Defence'. DSTO was also described as having a fluctuating focus on unmanned platforms. ACUO identified DSTO as a 'focal point for Defence's experimentation with UAS on a broad frontage, this ranging from airframes, propulsion systems, sensors, guidance and control and flight testing of complete systems, subsystems, and unit items'. However, it considered DSTO's overall level of engagement with the national UAS industrial base was 'not reflective of the realities of the sector as currently exists and is likely to exist in short years'.<sup>7</sup>

6.7 A need for further support for research and development into unmanned platforms was identified. The Australian Association for Unmanned Systems (AAUS) considered that Australian industry 'has demonstrated "runs on the board" with respect to world-leading innovative unmanned systems R&D'. It stated:

The ADF/DSTO have provided support for a small number of research and development programs through funding programs such as concept technology demonstrators (CTD). We believe that it is in the national interest to increase support for local R&D for reasons of strategic national security and economic prosperity. It is a potential growth sector and one that Australia has proven competence.<sup>8</sup>

6.8 Similarly, the ARCAA stated:

There is an opportunity for greater federal leadership and R&D support for the growth of a UAS industry for the purposes of national security and economic prosperity. Whereas competitive university research is predominantly supported through the Australian Research Council, there is

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4 *Submission 23*, p. 14.

5 *Submission 24*, p. 3.

6 For example, Dr Derek Rogers, *Committee Hansard*, 14 April 2015, pp 20-21.

7 *Submission 11*, p. 35.

8 *Submission 17*, p. 3.

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a need to provide greater support to realise commercial outcomes from research.<sup>9</sup>

6.9 Dr Andrew Davies from ASPI noted the relatively small budget for Defence research and innovation through the Rapid Prototyping, Development and Evaluation Program and the Capability and Technology Demonstrator Program. He commented:

One of things I would very much like to see is the Department of Defence taking a more experimental approach to developing drone capability in Australia. The Land 129 project under Army stagnated for a very long time, and they were more or less dragged kicking and screaming into grabbing something and using it with the operations in Afghanistan. There is a lot to be said for experimentation, and natural selection will identify the industry players who can add value.<sup>10</sup>

6.10 Mr Ken Crowe outlined Northrop Grumman's engagement with the community and academia, including providing PhD placements.<sup>11</sup> He commented:

The strength of the Australian workforce, I believe, it in its innovation...Australia's small population and its huge maritime and land areas of interest demand of us more from our systems. We cannot afford to use them in the same way that other countries will use them. I think that the primary opportunities for Australia's students, technical resources, engineers and scientists is by investigating the innovative use of this technology, not just to meet Australia's requirements for situation awareness, for surveillance, for long-range mission but to then feed them back perhaps through OEMs to the rest of the world.<sup>12</sup>

## Defence industrial base

6.11 A new Defence Industry Policy Statement will be released following the release of the Defence White Paper 2015.<sup>13</sup> The *Defence Issues Paper 2014* outlined that worldwide trends have put pressure on the local defence industry:

Sophisticated military equipment has become steadily more expensive and resource intensive to develop and produce. The ability of individual countries to maintain an end-to end capability has diminished. The result has been a trend towards multinational collaboration and the globalisation of the defence industry sector. Equipment for the ADF is often sourced from offshore suppliers.<sup>14</sup>

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9 *Submission 21*, p. 3.

10 *Committee Hansard*, 14 April 2015, p. 25.

11 Mr Ken Crowe, Northrop Grumman, *Committee Hansard*, 14 April 2015, p. 16.

12 Mr Ken Crowe, Northrop Grumman, *Committee Hansard*, 14 April 2015, p. 17.

13 The Hon Kevin Andrews MP, Minister for Defence, *Speech to Australian Member Committee of the Council for Security Cooperation in the Asia Pacific*, 22 May 2015.

14 Department of Defence, *Defence Issues Paper*, 2014, p. 23.

6.12 Defence noted that 'Australia holds a significant body of advanced engineering development expertise relevant to unmanned systems in industry'. However, it acknowledged that 'some reduction in industry development effort is being experienced in recent years due to a lack of uptake and a more stringent national regulatory environment'.<sup>15</sup>

6.13 Despite these challenges, many contributors were optimistic regarding the future of Australia's unmanned platform industry.<sup>16</sup> Mr Peter La Franchi, who appeared with Australian Certified UAV Operators (ACUO), considered there were clear opportunities for Australian industry 'in terms of software systems related to imagery intelligence, in terms of sensor payloads and in terms of finding derivatives that might flow across to the commercial marketplace'.<sup>17</sup> Mr Brad Mason, also from ACUO, outlined the achievements being made by the Australian UAV industry:

Australia's UAS industry is currently well placed in global terms. Our sector has proven it can be competitive and penetrate portions of the world market. The US Navy and Special Operations Command use Australian designed and manufactured Aerosonde mark 4.7 systems in operational roles with deliveries on an ongoing basis. The Royal Thai Air Force Academy uses Australian designed and manufactured Cyber Technology CyberEye II V2 systems as training assets. The United States Air Force's Eglin range uses Australian designed and manufactured Silvertone Flamingo systems as flying test beds for experimental sensors. New generation engines from the Australian Stock Exchange listed Orbital are being adopted by Boeing Insitu for its future production ScanEagle systems. Melbourne based Sentient Vision Systems has successfully entered the United States military UAS market with its Kestrel movement detection software.<sup>18</sup>

6.14 The growth of commercial unmanned platforms businesses was also highlighted by ACUO, which noted its membership had grown from eight operators in 2009 to over 200. Mr La Franchi highlighted that large mining, engineering and resources companies in Australia were developing unmanned system capabilities for survey work, pipeline monitoring and surveillance of facilities.<sup>19</sup> Saab Australia also noted that unmanned platforms were also likely to be further utilised in other industries in Australia 'with crossovers between defence and other industries such as Oil and Gas, Mining, Customs and Border Protection, Remote Surveillance, and Agriculture and Fishing'. It commented:

Unmanned Surface Vessels are truly an emerging opportunity and one Australian Industry can take an active and world leading role in, leveraging

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15 *Submission 23*, p. 14.

16 *Submission 11*, p. 11.

17 *Committee Hansard*, 14 April 2015, p. 7.

18 *Committee Hansard*, 14 April 2015, p. 1.

19 *Committee Hansard*, 14 April 2015, pp 4-5.

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the skills of our Publicly Funded Research Organisations (PFRO) in collaboration with key Electronics and Information Technology (ICT) industry players and skilled boat and ship builders.<sup>20</sup>

6.15 Mr Anthony Patterson from Cobham Aviation Services also suggested that Australia could generate expertise 'in the operation of these systems...rather than just being single-mindedly focused on manufacture'. He noted that while there was a focus on manufacture 'in terms of the amount of spend or revenue that is generated or spent, operations is a very large area of economic activity.'<sup>21</sup>

6.16 Northrop Grumman observed that the Australian research sector and industrial base lacked the scope and depth to cover all areas of unmanned systems development. It considered most major unmanned systems developments would occur overseas and be driven by the US defence/industrial base. However, it stated that Australian research organisations and industry do have the skills to become significant players in niche areas related to unmanned systems development. It recommended:

Australia should seek involvement in:

- unmanned systems co-operative development programs with US partners;
- unmanned systems research, trials and demonstration programs;
- the development of supporting unmanned systems technologies, such as software, communication or sensor technologies; and
- the development of the supporting PED systems and data processing technologies, without which unmanned systems will largely be ineffective...

[R]ealistically, as the range, pace and depth of unmanned technological developments will tax the capabilities of Australia's relatively small military/industrial base, the most sensible and cost effective approach is for Australia to seek to collaborate with the US and the other trusted allies, as a contributing junior partner, in selected and appropriate unmanned programs...<sup>22</sup>

6.17 Cobham Aviation Services took a similar view:

From an Australian industry perspective it is most logical to follow the manned aircraft industry model driven by the market size where the larger more complex platforms originate from the established manufacturers and Australia's RPAS manufacturing opportunities focussed on the smaller

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20 *Submission 24*, p. 7.

21 *Committee Hansard*, 4 May 2015, p. 6.

22 *Submission 12*, p. 8; Also see Mr Ken Crowe, Northrop Grumman, *Committee Hansard*, 14 April 2015, p. 15.

platforms and the development of unique sensor packages for integration into the larger platforms.<sup>23</sup>

6.18 The ACUO submission made a large number of proposals for supporting Australian defence industry involvement in UAVs. These included:

- developing and adopting a national Unmanned Aircraft Industry Strategy which links its requirements with the rapidly expanding domestic commercial UAV sector;
- the establishment of domestic sourcing thresholds for Group I and Group II UAV adopted by the ADF as a means of reducing its costs of acquisition, operation and support by linking with commercial development activity;
- the formal establishment of project offices for developing ADF Group IV UAV and Royal Australian Navy maritime UAS capabilities; and
- the establishment of a commercially provided UAS training capability for the ADF at the Group I and Group II level by leveraging the near 200 commercially certified UAV operators already trading in the Australian domestic market.<sup>24</sup>

6.19 The need to support exports of Australian defence products related to unmanned platforms has also been highlighted. CEA Technologies, which produces Phased Array Radar systems, has noted that valuable assistance to Australian defence exports can be provided from the Australian Military Sales Office and the Defence Export Control Office. However, it also identified the lack of a defined process to assist Australian Government sales of sensitive defence technologies as well as complications with the administration of the Defence Strategic Goods List as challenges for Australian defence exporters.<sup>25</sup>

## **Acquisition and procurement**

6.20 Some contributors to the inquiry suggested that Australia had been slow or reluctant to adopt unmanned platforms for defence purposes. For example, Mr Brian Weston stated that 'Australia despite its compelling [UAV] friendly geography and environment has lagged in investing in [UAV] capability'.<sup>26</sup> Cobham Aviation Services considered that the 'current White Paper development and associated Force Structure Review, Defence Capability Plan and appropriate Defence budget are the opportunities for the capability acquisition process to catch up and deliver unmanned

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23 *Submission 14*, p. 5.

24 *Submission 11*, pp 1-2.

25 CEA Technologies, *Submission 38*, pp 1-4 to the Joint Standing Committee on Foreign Affairs, Defence and Trade inquiry into Australian defence industry exports.

26 *Submission 4*, p. 4.

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systems to the ADF that it requires to maintain Defence capability advantage in today's world'.<sup>27</sup>

6.21 There were indications that Defence's rapid acquisition of unmanned platforms to address operational needs had affected opportunities for Australian defence industry involvement. ACUO listed a series of examples of 'project failures', 'sliding milestones for new capability developments', 'missed opportunities', 'failed multilateral cooperation activities' and 'poor in-service support planning' in relation to unmanned platforms acquisitions.<sup>28</sup> Mr La Franchi who appeared with ACUO stated:

We have had a fairly significant war to focus upon, and industry engagement has suffered as a result of that across the board at a broad level. The unmanned systems industry has to some extent been held at arms' length. Where there have been priority military requirements to support war-fighting operations those sections of our industry have done well; they have been able to reach in and establish good relations.<sup>29</sup>

6.22 The AAUS commented:

Whilst Australia has a significant unmanned platform industry, the ADF does not operate any locally developed or manufactured systems. A possible reason for this is that apart from JP129 and Air7000, the indigenous unmanned platform industry has not been able to obtain a clear strategic view of ADF requirements and have been caught off-guard by these rapid acquisitions.<sup>30</sup>

6.23 ACUO observed that 'the limited UAS capability now fielded by the ADF comes after significant financial outlays over the past 14 years'. It argued that the discrepancy between the fiscal commitments and extant ADF operational capability in relation to UAS 'points to a problematic engagement by Defence with the Australian UAS industrial base at a broad level'.<sup>31</sup>

6.24 The rapid development of unmanned platforms was also seen as introducing risks for defence procurement decisions. The ACUO highlighted that '[c]ontemporary UAS development cycles are instead more closely aligned with consumer technology trends, this facilitating a tempo which is also well ahead of the timeframes associated with research and development as conducted by traditional academic institutions'. It considered '[t]his shift poses challenges for the Australian Defence Organisation in the broad, requiring adoption of a posture of continual learning in its doctrinal,

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27 *Submission 14*, p. 4.

28 *Submission 11*, pp 8-10.

29 *Committee Hansard*, 14 April 2015, p. 4.

30 *Submission 17*, p. 2.

31 *Submission 11*, p. 8.

technological and acquisition practices if it is to attain the full benefits of the ongoing UAS revolution'.<sup>32</sup>

6.25 Similarly, the AAUS commented:

Unmanned system programs outlined in the current Defence Capability Plan (DCP) are those with typical Defence acquisition timescales. The developmental pace of unmanned systems in the US and Israel has seen relevant technology become available to the ADF in timescales much shorter than White Paper or DCP timescales.

The Australian Government has an opportunity to develop a more agile plan to allow this rapidly evolving technology to be utilised quickly by the ADF, whilst keeping the indigenous industry actively engaged.<sup>33</sup>

6.26 In the context of a rapidly evolving area of technology, Dr Andrew Carr suggested 'Australia should focus on smaller single-purpose "swarm" technologies rather than multiple-purpose mega systems':

To put it in the words of one report on defence technology: It should buy more R2D2's and less Death-Stars. As we do not know how the technology will develop, a focus on purpose and processes rather than platforms is important...With emergent technologies like unmanned platforms however, a focus on quick development, testing and replacement is critical until the ADF gains mature knowledge of how best to use these systems.<sup>34</sup>

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32 *Submission 11*, p. 10.

33 *Submission 17*, p. 2.

34 *Submission 19*, p. 2.