
Defence Industry and Innovation Policy

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In addressing defence industry policy, the 2013 White Paper reaffirms well established themes that need revisiting in the light of changing economic, strategic and technological circumstances: The strategic importance of a local defence industry base; the economic constraints that preclude materiel self-sufficiency; Defence use of open and effective competition to achieve value for money in procuring goods and services; and the linkage between of local industry involvement in upstream procurement and local industry's capacity to support ADF equipment downstream in service. Maturing initiatives like the Priority Industry Capabilities and the Australia-US Defence Trade Treaty are platforms for future defence industry policy development, which will also be affected by growing awareness of the link between innovation and productivity, and potentially far reaching changes in the Defence Science and Technology Organisation's research priorities.

This review of the defence industry and innovation policy element of the 2013 White Paper is arranged in three sections: The first section analyses familiar themes in light of contemporary developments. The second section explores the defence industry policy consequences of the promulgation of Priority Industry Capabilities (PICs) and the entry into force of the Australia-United States Defence Trade Treaty. The third section assesses the implications for defence industry of the 2013 White Paper's treatment of innovation, and of the shift in Defence Research, Science and Technology Organisation (DSTO) research priorities.

Familiar Themes and Contemporary Realities

Like its predecessors, the 2013 White Paper reaffirms certain basic policy parameters which, when juxtaposed, highlight the fundamental tensions in Australian defence industry policy. Such tensions include:

- The White Paper's affirmation of the vital role played by a competitive, efficient and skilled Australian defence industry in helping Defence achieve its strategic objectives, while at the same time insisting on benchmarking the risks and benefits of more developmental or bespoke procurement proposals against off-the-shelf solutions imported from overseas;
- The White Paper's recognition of, on one hand, massive structural changes in global defence industry that have continued since the end of the Cold War and, on the other hand, the economic constraints resulting from the size of the Australian population and industry base that preclude total self sufficiency in all possible defence industry capabilities; and

- The White Paper's emphasis on fostering collaborative partnerships between Defence and local industry, while at the same time insisting on open and effective competition wherever possible in order to ensure value for money.¹

THE ROLE OF AUSTRALIAN DEFENCE INDUSTRY

Generalised references to the strategic importance of Australian defence industry tend to mask the specific contribution made by that industry to the principal tasks performed by the Australian Defence Force (ADF).² Policy and public attention tends to focus on Australian industry involvement in major capital equipment projects like the Future Submarine Program, which the White Paper bills as the "largest and most complex project ever undertaken in Australia's history" and as "a true nation building endeavour".³ This sort of language is unhelpful, at least in defence industry policy terms, because the ensuing debate over industry involvement in such major procurements tends to eclipse the role played by Australian industry in underpinning ADF preparedness.⁴ The latter is now irreversibly dependent on Australian industry support as a result of past policy choices, labour market developments and technological change.⁵

Local industry support for preparedness attracts less policy and political attention than local industry involvement in construction. But it is local industry support for preparedness that increasingly determines the military options available to the Australian Government of the day. Action to foster local industry capacity to support preparedness, however, is blunted by the divergent incentives flowing from the way Defence has divided responsibility between the Service Chiefs (who, as capability managers, are accountable for preparedness) and the Defence Materiel Organisation (DMO), which is accountable for both acquisition and sustainment. These incentives warrant closer examination from a defence industry policy perspective.

ADF preparedness depends on, among other fundamental inputs, the standard to which its equipment is repaired, maintained and adapted. Globalisation of defence industry has combined with Australian policy to mean that repair, maintenance and adaptation of ADF platforms and systems is undertaken by a combination of Australian owned companies, local subsidiaries of overseas primes and original equipment manufacturers.

¹ These juxtapositions are based on: Commonwealth of Australia, *Defence White Paper 2013* (Canberra: Department of Defence, 2013), paras 12.1-22.

² See ADF Principal Tasks and Australia's Military Strategy, in *ibid.*, paras 3.30-60.

³ *Ibid.*, para 12.53.

⁴ In this article, 'military capability' comprises force structure and preparedness. 'Preparedness' comprises readiness and sustainability.

⁵ Robert Wylie, 'Supplying and Supporting Force 2030: Defence Policy for Australian Industry', *Security Challenges*, vol 5, no. 2 (Winter 2009), p. 119.

As ADF platforms and systems become more technologically sophisticated, however, local industry's capacity to repair, maintain and adapt ADF equipment downstream in-service depends increasingly on the quality of its involvement in the supply of that equipment upstream in procurement. Under current arrangements, DMO is responsible for the quality of local industry involvement in upstream procurement, and for the placement of the sustainment contracts under which local industry undertakes the repair, maintenance and adaptation of ADF equipment downstream in-service.

Clearly, sustainment is a critical input to preparedness. But the preparedness of ADF materiel and the sustainment of that materiel are different functions, performed by different agencies with divergent interests. Under Defence's current administrative arrangements, the linkage between the Capability Manager's preparedness activity and the DMO's sustainment activity depends on the Materiel Sustainment Agreement between them. Both Rizzo⁶ and the Senate Foreign Affairs, Defence and Trade References Committee⁷ suggest, however, that Materiel Sustainment Agreements need very substantial development if local industry involvement in sustainment is to be aligned with local industry support for preparedness.

According to the 2013 White Paper, the government expects the DMO to pursue deep and sustained reforms in response to the Rizzo and other reports. Such reforms include making:

a stronger role for capability managers in procurement and sustainment processes in particular through formal Materiel Acquisition Agreements (MAAs) and Materiel Sustainment Agreements (MSAs)⁸

Revising MSA so as to institute a stronger role for capability managers needs to take into account not only the accountabilities of the parties involved but also their incentives. The DMO needs stronger incentives to use local industry involvement in upstream capital equipment procurement to foster local industry capacity to provide the standard of repair, maintenance and adaptation needed downstream by the capability managers in meeting preparedness goals.

In response to sustained and occasionally strident criticism of cost overruns, schedule slippage and performance deficiencies in the procurement of defence capital equipment, the DMO benchmarks procurement from local suppliers against military-off-the-shelf (MOTS) and commercial-off-the-shelf (COTS) solutions to ADF requirements for military capability. The 2013 White Paper reaffirms Defence insistence on stringent justification for any

⁶ Paul Rizzo, *Plan to Reform Support Ship Repair and Maintenance Practices* (Canberra: Commonwealth of Australia, 2011), p. 9.

⁷ Foreign Affairs, Defence and Trade References Committee, *Procurement procedures for Defence capital projects – Final Report* (Canberra: Parliament of Australia, 2012), p. 130.

⁸ Commonwealth of Australia, *Defence White Paper 2013*, para 9.21.

departure from MOTS and COTS solutions to defence materiel requirements.⁹

In principle, it makes eminently good sense to require the most stringent justification for any local production that entails cost, schedule or technical risk beyond that associated with MOTS or COTS solutions. In practice, however, organisational and institutional arrangements for judging the balance of merit for local industry involvement and the criteria used in doing so have direct implications for local industry capacity to support ADF preparedness.

The DMO is a prescribed organisation that defines procurement project success in terms of cost, schedule and technical performance. But as Rizzo observed in his seminal report on failures in managing the preparedness of Navy's support ships:

The need for sustainment of assets is understood in Defence and the DMO, but it is not given the same rigorous attention as asset acquisition. Sustainment costs can exceed those of the original procurement and the challenges can be more complex.¹⁰

A prescribed DMO preoccupied with procuring capital equipment on time, to cost and as specified has little incentive to consider local industry's contribution to preparedness. Exhorting DMO to benchmark local procurement against MOTS/COTS solutions is at best simplistic. The policy task is judging the value to be accorded fostering the linkages between upstream Australian industry involvement in procurement and Australian industry capacity to support downstream preparedness. Under current administrative arrangements, attempts to contrive benchmarks against MOTS and COTS solutions risks distracting policy attention from the more demanding task of weighing the downstream value of local industry capacity to support preparedness against the upstream transaction costs inherent in providing for local industry involvement in capital equipment procurement.

In order to give DMO greater incentive to manage upstream procurement with an eye to fostering local industry's capacity to meet capability managers' downstream preparedness requirements, the MAAs and the MSAs need to move beyond their current focus on cost, schedule and equipment performance. These quasi-commercial but non-contestable purchaser-provider arrangements need to recognise more clearly the principal-agent relationship that exists between capability managers and the DMO. This means that MSAs and MAAs need to give much more explicit weight to the information asymmetries and divergent incentives inherent in such relationships. To this end the agreements need to assign DMO explicit responsibility for taking action to foster preparedness-oriented local industry

⁹ Ibid., para 12.8.

¹⁰ Rizzo, *Plan to Reform Support Ship Repair and Maintenance Practices*, p. 8.

capacity, and oblige the DMO and capability managers to work together to define appropriate metrics for gauging local industry capacity to meet preparedness requirements. Finally, and in the absence of true market signals, DMO and the capability managers need to report on the preparedness outcomes of local industry involvement in sustainment both internally and in Defence Annual Reports.

STRUCTURAL CHANGE IN DEFENCE INDUSTRY

The 2013 White Paper alludes to on-going structural change in global defence industry and enduring economic constraints on what Australian industry can reasonably supply and support. But its assessment of the appropriate policy response to these imperatives is largely implicit.

Australian defence industry is dominated by eight prime contractors (Australian Submarine Corporation (ASC), Australian Aerospace, BAE Systems, Boeing, Raytheon, SAAB, Lockheed Martin and Thales) which together account for some 70 per cent of DMO expenditure on the acquisition and sustainment of defence equipment. Of the revenue the prime contractors generate by selling to the DMO, about 30 per cent flows to the estimated 3000 Small and Medium Enterprises (SMEs) in Australia's domestic defence industry base.¹¹ As the 2010 statement of defence industry policy has observed:

The relationship between the primes and the SMEs is crucial. Defence needs strong relationships between these organisations to ensure that its capability needs are developed on time and on budget. The primes need to nurture and support the SMEs, which are a vital source of innovation and niche capability in the local defence marketplace. In turn the SMEs need a strong relationship with the primes to capitalise on their products and to use these relationships to gain access to the global defence market.¹²

The 2013 White Paper acknowledged the particular importance to SMEs of an assured flow of work. To this end, the White Paper urged SMEs to consider focusing on opportunities in the repair, maintenance and upgrade of Defence's existing platforms and systems which, given the current fiscal outlook, are set to increase.¹³

Simultaneously, the 2013 White Paper urges local companies, including SMEs, to look for business abroad:

Internationally, the Australia in the Asian Century White Paper identifies opportunities for Australian business to contribute to and benefit from growing regional prosperity. Such opportunities can provide a broader

¹¹ Minister for Defence Materiel and Science, *Building Defence Capability: A Policy for a Smarter and More Agile Defence Industry Base* (Canberra: Commonwealth of Australia, 2010), pp. 28-29.

¹² *Ibid.*, p. 29.

¹³ Commonwealth of Australia, *Defence White Paper 2013*, para 12.15.

market for Australian defence firms to sustain and grow the capacities that are essential for equipping and operation of the ADF.¹⁴

This proposition echoes the approach to defence exports advocated by the Australian Industry Group (AIG) Defence Council in its submission to the 2013 White Paper process. The Council recommended:

exploring potential defence markets in South East Asia flowing from the expertise of our defence industry in adapting, repairing and maintaining defence equipment and its experience as a provider of a wide range of support services to the ADF—such as training, simulation, logistics and garrison support.¹⁵

The White Paper draws attention to some practical Defence initiatives that seem consistent with the Council's approach: Defence has established the Australian Military Sales Office to subsume previously separate functions related to disposals, exports, and the global supply chain. It will also introduce an Australian version of the US Foreign Military Sales system to facilitate government-to-government sales of defence equipment.¹⁶

Such initiatives warrant cautious welcome. Australia's previous defence export initiatives have yielded modest returns, however, and the key criteria for defence export support should be the contribution such exports make to ADF preparedness. Overseas sales of defence goods and services are a windfall for the Australian companies concerned. In fostering the capacity of Australian companies to support ADF preparedness at home, the DMO is establishing the pre-requisites for successful service-oriented exports along the lines envisaged by the AIG Defence Council.

Focusing more on preparedness would probably mean changing some current initiatives: We can all applaud local company success in gaining reportedly lucrative orders for composite doors and panels for the Joint Strike Fighter (JSF).¹⁷ Such exports may well help advance the non-defence aerospace sector of the Australian manufacturing base. But they will do little to support the self reliant operation of the JSF in Australian service.

The same logic applies to the Global Supply Chain Program, launched in 2009. Under this program, Defence will pay its multinational suppliers \$59.9 million over 2009-10 to 2018-19 to establish internal sponsors to promote Australian industry into their respective business units. The staff are supposed to actively seek out opportunities for Australian industry, to train Australian industry in the company's purchasing procedures and to educate

¹⁴ Ibid., para 12.6.

¹⁵ Australian Industry Group Defence Council, *Why we need a more focussed Defence Industry Policy*, Submission to the 2013 Defence White Paper process, 2013, p. 6.

¹⁶ Commonwealth of Australia, *Defence White Paper 2013*, para 12.40.

¹⁷ See Asia Pacific Defence Reporter, 'JSF – Australian Industry Participation', 16 April 2010, <www.asiapacificdefencereporter.com/articles/1/JSF-Australia-Industry-Participation> [Accessed 11 June 2013].

Australian industry in the company's requirements.¹⁸ To date, Defence has concluded agreements with Boeing, Raytheon, Thales, Northrop Grumman, Lockheed Martin, BAE Systems and Finmeccanica.¹⁹

Clearly, Australian companies participating in the program stand to gain substantial commercial benefit. Such participation also helps the Minister for Innovation, Industry, Science and Research advance the government's policy objective of fostering an internationally competitive, niche-based aerospace industry. But the Global Supply Chain Program seems unlikely to contribute materially to local industry's capacity to support the preparedness of ADF platforms and systems. In present financial circumstances, therefore, the \$59.9 million Defence has budgeted for the Program would seem better spent on creating opportunities for SMEs to support ADF preparedness. This might start by reinvigorating the provisions for Australian industry involvement in defence major capital equipment procurement contracts. Such involvement might be linked to more rigorous preparedness metrics devised by DMO and capability managers and embedded in the enhanced MSAs discussed earlier in this article. This approach would favour the kind of service oriented exports advocated by the AIG Defence Council.

THE DEFENCE-INDUSTRY RELATIONSHIP

In discussing the relationship between Defence and industry, the 2013 White Paper drew attention to the new format in which defence procurement plans will be promulgated.²⁰ Such information is, obviously, a necessary condition for a sound relationship between Defence and industry, but more needs to be said about the institutional arrangements governing the transactions between the Defence customer and the industry supplier. As the 2013 White Paper indicates, these arrangements have been the subject of sustained management and political attention in recent years.²¹ Key influences on the defence industry relationship include Defence competition policy and Defence contracting arrangements.

The 2013 White Paper's reaffirmation of long standing principles of open and effective competition belies the more nuanced arrangements Defence has implemented in naval support:

Competitively tendering every major Fleet Unit repair and maintenance episode is inefficient. The disaggregation of the maintenance program places contractors in a stop-start routine generating start-up and wind-down costs for both the contractor and Defence. Putting every individual ship repair contract out to tender failed to secure value for money because the

¹⁸ Minister for Defence Materiel and Science, *Building Defence Capability*, p. 14.

¹⁹ See Defence Materiel Organisation, 'Global Supply Chain Program', <www.defence.gov.au/dmo/id/gsc/index.cfm> [Accessed 2 June 2013].

²⁰ Commonwealth of Australia, *Defence White Paper 2013*, para 12.20.

²¹ *Ibid*, paras 9.20-25.

lack of continuity prevented naval ship repair companies from investing in the infrastructure and workforce needed to deliver the best price.²²

The naval support business model requires industry to compete for a limited market rather than insisting on competition within a limited market.²³ Defence might consider refining and extending this business model so as to create the incentives industry needs to invest in the capacity required to provide effective support to ADF preparedness.

Innovative contracting arrangements are pivotal to realisation of the White Paper's vision of a truly collaborative partnership between Defence and industry.²⁴ One such innovation is Defence's growing use of incentive contracts. These encourage suppliers to meet or exceed contracted performance, delivery, cost and/or quality requirements. The essential elements of an incentive contract include the target cost (which is Defence and the supplier's best estimate of what the cost will be when the work is done); a target fee (which is the amount of profit the supplier will earn without adjustment if the target cost is met); and a formula for determining how Defence and the supplier share excess cost or savings.²⁵

In his study into the sustainment of the Collins class submarines, Coles recommended replacing the existing Through Life Support Agreement between ASC and DMO with an incentive based contract.²⁶ Recent improvement in Collins class availability has been attributed to early Defence and ASC implementation of this recommendation. However, as the DMO Chief Executive has reportedly acknowledged, successful incentive based contracting requires defence contracting officials and sustainment managers to exercise a particularly high level of business acumen.²⁷ The failure of an early version of a target cost incentive fee contract concluded between Defence and Telstra for the design, development and production of the Jindalee Operational Radar Network (JORN) is a graphic illustration of what happens when such business acumen is lacking.

For defence business managers to achieve the requisite level of business acumen, they will need far more than on-the-job training. More generally, the 2013 Defence White Paper shows little appreciation of the commercial incentives that motivate industry to make the investments required to take "a leadership role in delivering world class capabilities to the ADF."²⁸ To

²² Minister for Defence Materiel and Science, *Building Defence Capability*, p. 48.

²³ S. Markowski, P. Hall and R. Wylie (eds), *Defence Procurement and Industry Policy—A Small Country Perspective* (Routledge: London, 2010), pp. 118-119.

²⁴ Commonwealth of Australia, *Defence White Paper 2013*, para 12.17.

²⁵ Minister for Defence Materiel and Science, *Building Defence Capability*, p. 53.

²⁶ John Coles, *Study Into the Business of Sustaining Australia's Strategic Collins Class Submarine Capability* (Canberra: Commonwealth of Australia, 2012), pp. 35-36.

²⁷ L. Battersby and B. Butler, 'Defence Force says it lacks good business skills to deal with the US', *Canberra Times*, 8 March 2013.

²⁸ Commonwealth of Australia, *Defence White Paper 2013*, para 12.16.

remedy this, DMO and Defence may need to adjust the courses offered by, for example, the DMO Institute and the Capability and Technology Management College.²⁹

Priority Industry Capabilities and the Defence Trade Treaty

According to the 2010 Defence Industry Statement, capacity in defence industry cannot be taken for granted and must be planned, built, managed and continually re-shaped.³⁰ As a monopsonist, Defence shapes local industry capacity directly through what business it does and how it does that business. Defence stands to exert more indirect but far reaching influence via its support for PICs and its role in implementing the Defense Trade Cooperation Treaty between Australia and the United States.

PRIORITY INDUSTRY CAPABILITIES

According to the 2013 White Paper, Defence will continue investing in PICs. PICs are those capabilities which confer an essential strategic advantage by being resident in Australia and which, if not available, would significantly undermine defence self reliance and ADF operational capability. After some dissembling³¹ Defence announced the following PICs in 2009: Acoustic technologies and systems; Anti-tampering capabilities; Combat uniforms and personal equipment; Electronic warfare; 'High end' systems and system of systems integration; High frequency and phased array radar; Infantry weapons and remote weapons stations; In-service support of Collins Class submarine combat system; Selected ballistic munitions and explosives; Ship dry docking facilities and common user facilities; Signature management; Through-life and real time support of mission critical and safety critical software.

The primary focus of the PICs is support for the preparedness of the extant force in-being. For example, the high frequency and phased array PIC is primarily about the preparedness of, respectively, JORN and the ANZAC ships (via the latters' anti-ship missile defence system). PIC policy is notable for its evolutionary approach to defence industry capacity:

the PICs reflect currently available technology and contemporary industry and market structure, strategic guidance, and Government demand—they are effectively a snapshot of Defence's capability priorities for domestic industry at this point in time. But technology and the ADF's capability needs change rapidly. Strategic guidance and demand patterns also change over time.

²⁹ See 'DMO Institute', <www.defence.gov.au/dmo/id/dmoi/index.cfm> [Accessed 16 June 2013].

³⁰ Minister for Defence Materiel and Science, *Building Defence Capability*, p. 15.

³¹ Defence industry can thank Paul Dibb for shaming Defence into public announcement of the PICs. See Paul Dibb, 'The Good, the Bad and the Ugly: Australia's New Defence White Paper', Speech to the National Press Club, 24 June 2009, p. 6.

The PICs need to be regularly reviewed and updated to take account of these changes. This will occur through the annual classified Defence Planning Guidance. While some capabilities may be added to the PICs through this review process, industry should also expect that some current PICs will not need to be retained in the future.³²

Defence's subsequent review of the health of each PIC clarifies how the PIC policy model will work in practice. The review was fundamentally about ascertaining whether government should intervene to assure PIC health and how it should do so.³³ Defence published the outcome of each PIC health assessment in commendably detailed fact sheets. For example, it considered the JORN element of the High Frequency and Phased Array Radars PIC unhealthy³⁴ and in response to this assessment, Defence intervened directly to support JORN-related industry capabilities through a series of bridging projects designed to ensure continuity of demand for Lockheed Martin Australia and BAE Systems,³⁵ who have invested in the ongoing development of the highly specialised skills required to maintain JORN preparedness at the requisite level.³⁶

THE AUSTRALIA-UNITED STATES DEFENCE TRADE TREATY

The 2013 White Paper also draws attention to the entry into force of the Treaty between the Government of Australia and the Government of the United States of America Concerning Defense Trade Cooperation. Curiously, the White Paper refers to the Treaty in terms of its utility to local exporters.³⁷ This potentially far reaching initiative warrants fuller treatment.

The Treaty came into force on 16 May 2013,³⁸ some six years after it was signed in 2007. This lag reflects the complexity of the adjustments required of the Australian Government and other Treaty stakeholders in meeting Australia's obligations under the Treaty, while at the same time securing its benefits. One such action is enacting the Defence Trade Controls Act 2012.

The Treaty aims to facilitate the diffusion of eligible defence goods, services and technology between members of an approved community of government agencies and companies without the need to apply for separate export

³² Minister for Defence Materiel and Science, *Building Defence Capability*, p. 42.

³³ See Defence Materiel Organisation, 'Priority Industry Capabilities', <www.defence.gov.au/dmo/id/pic/index.cfm> [Accessed 14 June 2013].

³⁴ Defence Materiel Organisation, 'Priority Industry Capability Health Check 2013 – High Frequency and Phased Array Radars', <www.defence.gov.au/dmo/id/pic/docs/PIC_FactSheet_HFPAR.pdf> [Accessed 14 June 2013].

³⁵ See Department of Defence, *Defence Capability Plan 2012* (Canberra: Commonwealth of Australia, 2012), pp. 99-101.

³⁶ Department of Defence, *Defence Materiel Organisation - Top 30 Sustainment Project Descriptions (Electronic Systems Products: Wide Area Surveillance*, Defence Portfolio Budget Statements 2013-14 (Canberra: Commonwealth of Australia, 2013), p. 180.

³⁷ Commonwealth of Australia, *Defence White Paper 2013*, para 12.44.

³⁸ See Minister for Defence, *Media Release – Defence Trade Cooperation Treaty comes into force*, 16 May 2013, <www.minister.defence.gov.au/2013/05/16/minister-for-defence-media-release-defence-trade-cooperation-treaty-comes-into-force/> [Accessed 14 June 2013].

licenses. The benefits of the Treaty should not be oversold: It does not cover the diffusion of numerous US technologies, access to which is critical to the ADF military competitiveness. Such technologies remain subject to case-by-case approval by the US State Department under the US International Traffic in Arms Regulations.³⁹

In order to gain the benefits of this Treaty, Australia also undertook to join the United States and other like-minded countries in seeking to control the diffusion of sensitive technology in both tangible and intangible form. Australia already controls the export of tangible defence goods and goods with dual civil and military use under Regulation 13E of the Customs (Prohibited Exports) Regulations 1958. The Defence Trade Controls Act 2012, which was proclaimed on 6 June 2013, is intended to strengthen Australia's existing defence export controls by requiring licenses for the supply of sensitive defence and dual use technologies in intangible form, including by email, facsimile, and the internet.⁴⁰

Sorting this out involves not only Defence but also the Tertiary Education, Skills, Science and Research Portfolio. Implementing the Defence Trade Controls Act will affect not only companies doing business in defence and dual use technologies but also universities doing advanced research. It will require balancing, on one hand, Australia's international obligations and national security requirements against, on the other hand, our trade interests, the competitiveness of our innovation and research and our ability to collaborate internationally. To this end the Act provides for a Steering Group, to be chaired by Australia's Chief Scientist, Professor Ian Chubb, to advise the Minister for Defence and the Minister for Tertiary Education, Skills, Science and Research on the

adequacy of the organisational and governmental arrangements, and the identification, assessment and management of risks, costs, and administrative burden associated with intangible transfers of Defence and Strategic Goods list technologies [and w]hether the Act, the regulations, and the implementation arrangements are not more restrictive than United States export control regulations in relation to university activities.⁴¹

Historically, Australian universities have been less involved in defence research and development than their US counterparts. This may be about to change, with potentially significant implications for defence-oriented innovation in Australia more generally.

³⁹ Robert Wylie, 'Facilitating Defence Trade Between Australia and the United States: A Vital Work in Progress', *Security Challenges*, vol. 4, no. 3 (Spring 2008), pp. 115-134.

⁴⁰ See Department of Defence, 'Frequently Asked Questions—Strengthened Export Controls', <www.defence.gov.au/deco/docs/FAQ_Strengthened_Export_Controls.pdf> [Accessed 14 June 2013].

⁴¹ *Ibid.*

Innovation

The 2013 White Paper depicts defence innovation in expansive terms:

The best innovation involves not just new or upgraded hardware, software capability, systems or individual platforms, but also improved business models and sustainment outcomes as well as a culture that fosters continuous improvement.⁴²

Defence needs to build on and extend this comprehensive perspective of defence innovation in the forthcoming Defence Industry Policy Statement.

The Rapid Prototyping, Development and Evaluation Program, initiated to provide innovative solutions to urgent operational requirements warrants much closer examination as a model for larger scale experimentation in Defence/industry/university collaboration. Similarly, the Diggerworks program, modelled on the US Marine Corps' Gruntworks program, aims to upgrade soldiers' close combat capabilities through industry innovation, technological advances and in-house solutions. The key to Diggerworks is an experiment in adaptive acquisition designed to support the continual development, design and/or procurement of equipment to enhance the capability of the combat soldier.⁴³ The forthcoming Defence Industry Policy Statement might review the implications, particularly for SMEs, of the adaptive acquisition experiment for defence competition policy and defence contracting policy discussed earlier in this article.

Finally, the successful incorporation of CEA Technology's active phased array technology in the ANZAC ship anti-ship missile defence program is a particularly heartening development. It shows that Defence organisational and institutional developments have not eliminated the appetite for risk inherent in pursuing innovations like JORN and the NULKA anti-ship missile defence system. It demonstrates that Australia's defence innovation community, including its companies, its scientists in DSTO, its armed services, its capability developers, its equipment procurers and its politicians can go beyond identifying opportunities and to adjust organisational and institutional arrangements so as to realise those opportunities.

These broadly framed innovations need to be analysed and discussed in the forthcoming defence industry policy statement. Capturing the lessons learnt from potentially far-reaching innovation is rendered particularly urgent by the developments foreshadowed in 2013-2018 Strategic Plan for the Defence Science and Technology Organisation promulgated in April 2013. The Strategic Plan acknowledges resource constraints and hinges on shifting of DSTO investment towards emerging areas of higher priority. In broad terms,

⁴² Commonwealth of Australia, *Defence White Paper 2013*, para 12.29.

⁴³ DMO Land Systems Division, 'Brief to the Integrated Soldier System Branch Forum', 5 October 2011.

over the next five years DSTO plans to lift investment in cyber, surveillance and space systems and in autonomous systems by 5-10 per cent; sustain its current level of capability in electronic warfare, information systems and chemical, biological, radiological and nuclear technologies; reduce by 5-10 per cent its investment in overall propulsion and energy, platforms, and weapons; and reduce by 10-20 per cent its investment in human science and operations analysis.⁴⁴

In general, the reductions foreshadowed by DSTO do not mean that Defence demand for scientific and technical support in these areas has lapsed. Defence will however need to look for support from other areas, including local industry and the universities. To this end, the DSTO strategic plan provides for a concerted effort to leverage the knowledge of external partners. Particularly important for present purposes is its commitment to working with industry in meeting Defence demand for sustainment.⁴⁵

Conclusion

The 2013 White Paper subsumes important developments in both defence industry policy and in defence science and technology in the four years that have elapsed since the 2009 White Paper. The overarching characteristic of these developments, however, is that they have emerged 'bottom up', in the course of practical problem solving. The next step is to complement—not supplant—this bottom up policy development by forging clearer links to evolving strategic guidance. This is probably a matter for the next government, whatever its political persuasion.

In developing a strategy-led approach while capitalising on the progress to date, the architects of the next iteration of defence industry policy might start by aligning local industry involvement in sustainment with local industry support for preparedness. In doing so they might use Defence experience in developing PICs in support of the force-in-being to inform development of strategic industry capabilities geared to the requirements of the future force. In order to ensure policy for the development of strategic industry capabilities accommodated the evolution of defence capability, the policy might be framed in terms of a defence innovation system that brings into a single coherent framework strategic and operational knowledge, institutions governing the diffusion of technology, the demand for military capability and the business acumen required to meet that demand.

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⁴⁴ Defence Science and Technology Organisation, *Strategic Plan 2013-2018* (Canberra: Department of Defence, 2013), pp. 34-35.

⁴⁵ *Ibid.*, p. 43.