

Hon. Warren Snowdon
Minister for Defence Science and Personnel
Parliament House
Canberra ACT 2600

24 September 2008

Dear Mr. Snowdon,

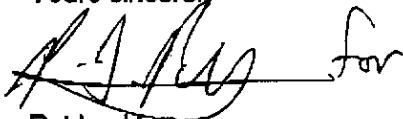
**Re: Perspective on Science and Technology to the Defence Whitepaper
Community Consultation Panel**

Thank you for the invitation to BAE Systems Australia to offer our organisation's perspective on science and technology to the Defence Whitepaper Community Consultation Panel. BAE Systems Australia considers science and technology to be a fundamental component of the Australian defence capability, and critical to the long term success of our organisation.

Please find attached a paper that presents BAE Systems Australia's views on the current status of science and technology related organisations, and the policy and processes that support these.

We would welcome any questions regarding the attached, and trust that it is of value to the whitepaper process.

Yours sincerely



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Executive Summary

BAE Systems Australia appreciates the opportunity to make a submission to the community consultation forum for Science and Technology (S&T) as an input to the Defence whitepaper development in response to the request for input from the honourable Warren Snowdon. This submission focusses on the Science and Technology aspects of BAE Systems activities and place in the Australian community.

This submission addresses Science and Technology as it affects BAE Systems Australia, with comment made Australia's S&T focused organisations, and on the process and implementation aspects of S&T in the defence sector.

From a defence industry perspective, S&T in Australia exists within an appropriate organisational structure, and there is a policy framework that with some modification would result in a healthy S&T environment delivering good outcomes to defence. Key recommendations are:

1. Ensure that DSTO remains a defence organisation and is not partially commercialised.
2. Establish a collaborative S&T agenda between Industry and DSTO, possibly through an external board of review.
3. Technology transition is an area for improvement. Assess and budget for the cost of transition of technology from DSTO and Capability Technology Demonstrators (CTD's) into industry and then into operational capability.
4. The CTD program has provided mixed outcomes. A stronger operational focus should be brought to the CTD program, and funding should be increased rather than decreased.
5. The Rapid Prototyping Development and Evaluation (RPDE) Organisation is successful. RPDE should be continued and strengthened.
6. Local industry is a critical part of Defence capability. DMO's acquisition criteria should be modified to recognise that Priority Local Industry Capability (PLIC) related acquisitions are different to those of routine acquisition. Preference needs to be given to PLICs.
7. Universities form a critical part of the S&T landscape. Stronger defence related links between universities and industry should be encouraged.
8. Clarity in areas of S&T that are important to defence would be well received. Identify Defence S&T priorities, and foster alignment with National Innovation schemes.
9. Alignment of S&T players will strengthen our capability. Establish International Centres of Excellence in Defence S&T, and establish further DFCTCs to meet defence S&T needs.

Introduction

- 1) The Science and Technology Environment in which the Australian Defence Organisation operates consists of a number of collaborating organisations and sectors. These include: The Defence Science and Technology Organisation (DSTO), Defence Materiel Organisation (DMO), Capability Development Group (CDG), Rapid Prototyping Development and Evaluation (RPDE), Industry, and the University Sector, including Cooperative Research Centres (CRCs).
- 2) The mechanisms in which industry carries out Defence related S&T are quite complex, this paper comments on the main areas:
 - a) Activities with DSTO and the RPDE organisations, provide an essential link to defence operators between industry and defence research and bring focus and context to industry strategic direction.
 - b) The Capability Technology Demonstrator (CTD) program, and CDE are a critical source of seed funding and enabler of industry funded S&T.
 - c) Collaboration with universities, industry collaborations such as "Team Australia" and international organisations are critical to leverage external sources of S&T.
- 3) The defence environment in Australia is changing, as is the global defence environment. This will effect the way that Australia acquires capability. This paper provides recommendations that seek to strengthen the alignment of S&T direction to long term defence needs:
 - a) There continues to be a strong focus on "platform acquisition" with a developing trend toward capability acquisition. This has resulted in a change in the capabilities required for Australia to retain self reliance, and thus the S&T activities that should be carried out. Current indications are that Systems Analysis, Systems Engineering, Systems Integration and Through Life Support are critical areas, more so than subsystem and product development.
 - b) The rise in the "asymmetric threat" and increased availability of high technology weapon systems has changed the threat environment for the Australian Defence Force (ADF), which should be matched by a corresponding change in the focus of indigenous S&T.
 - c) The selection of appropriate S&T programs to support these, with links to defence acquisition programs, will be critical to the long term delivery of S&T value to the nation. The need to maintain indigenous self reliance must be considered within this changing acquisition environment.
 - d) It is critical in the acquisition process that systems are selected which provide adequate Intellectual Property (IP) access and data to allow indigenous support. Experience on JSF has shown that an "open architecture" alone does not deliver the ability for indigenous innovations to be incorporated on a platform.

Observations

- 4) The maintenance of a defence capability within industry is not well supported by the "bust and boom" defence procurement cycle. A collaborative approach between all stakeholders is needed to maintain capability across these cycles and to develop plans to meet future capability needs.
- 5) The following observations are provided as they form part of the context within which industry S&T is carried out, and shape the long term goals of industry S&T:
 - a) The threat environment is changing. A profound example of this is the "asymmetric threat" and terrorist activities, however the conventional threat faced by the ADF is increasingly advanced and lethal. To maintain a capability against these threats will require significant and focussed S&T investment, and the harnessing of all S&T areas discussed in this paper.
 - b) The complexity of platforms and systems means that Australia will increasingly become a buyer and integrator of platforms rather than platform designer.
 - c) Platform systems performance is becoming driven by the subsystem software. The future cost of ownership needs to consider the ownership of this software. Appropriate ownership of this software will not only allow the ready replacement of platform sensor and effector subsystems but also to migrate platform combat awareness and responsiveness software from platform to platform.
 - d) Through life capability management will become increasingly important to the both the ADF and local industry.
 - e) The ADF will increasingly rely on technology to overcome resource limitations to achieve its mission.
 - f) Autonomous systems and technologies will proliferate, particularly in the Intelligence, Surveillance and Reconnaissance roles, and post JSF in the combat air vehicle role. The management, dissemination and processing of information from these assets will pose significant challenges for Australia. As will the establishment and testing of operational concepts and doctrines appropriate for the ADF.
 - g) NCW, information management and superiority will remain an important theme as the ADF seeks to exploit advances in the Information Communications Technology (ICT) domain to better utilise the sensors and systems in the field.
 - h) Rapid development of commercial telecommunications will trigger a significant change in military communications and situational awareness in the medium term.
 - i) A result of the above, in conjunction with data provided from collaborating nations, is that Australia will face the challenge of data processing, reduction, dissemination and the development of tools to enable adequate human-in-the-loop response times.

Defence Science and Technology Organisation

- 6) Outside their research activities, the DSTO plays a significant role providing technical advice to operational parts of Defence. This is a critical role, and depends on the underlying S&T activities DSTO performs to maintain the skill levels required. Any outcome of the whitepaper needs to maintain this capability for Defence.
- 7) DSTO's interaction with industry could be improved in a number of areas. Some of the key areas are listed below.
 - a) BAE Systems has a Strategic Alliance with DSTO, though outside the Weapon Systems and the Electronic Warfare and Radar Divisions this has had mixed success. Following the acquisition of Tenix Defence this is being remodelled. In the past, the DSTO executive has expressed a clear intent that industry alliances should exist. The communication of this throughout DSTO should be improved. DSTO staff are unclear about the terms of engagement with industry, and indeed any DSTO strategy for collaboration.
 - b) The mechanism for transferring IP from DSTO is in some areas onerous. Terms for access to IP has proven to be inconsistent across DSTO, and the expectations of DSTO as to the commercial value of IP is at times unreasonable.
 - c) The "Technology Readiness Level (TRL) Gap", the gap between prototype and final product, is a major challenge. Where DSTO research is aimed at delivering a supportable operational capability, it must be accompanied by the necessary investment to transition the technology into service. This cannot be achieved by DSTO alone. It is recommended that DSTO is funded and tasked to work more hand in hand with the DMO and industry in the development of technology and transition of this into service. The transition from concept to product needs to be better managed between DSTO and DMO so that industry has surety that products have a viable path to introduction into service. A concept that may be worth considering is an "Australia Incorporated" strategy that provides a roadmap from R&D through the CTD process into the DFCTC and hence into industry to provide a Defence Capability. Because funds are limited we should not start R&D unless "Australia Incorporated" is committed to take it the full life cycle.
 - d) DSTO undertake Technology Risk assessments on major capital acquisition programs as part of the acquisition process. This is used to inform decision-making within Defence however it is not shared with industry. The flow of this information to industry could reduce the technology risk on complex programs by allowing industry to undertake the appropriate risk mitigation.

RPDE

- 8) RPDE is proving to be successful, and has enabled greater industry exposure to the capability development process. RPDE has provided a truly collaborative mechanism between industry and defence to investigate Defence sponsored problems. This has provided significant opportunities for close interaction between Industry, Capability Development Group and the ADF.

- 9) RPDE is however increasingly undertaking DMO-style engagements with vendors by making use of "partner companies" to develop solutions rather than using the best people in the RPDE pool to perform capability analysis. This blurs the line between the roles of RPDE and DMO.
- 10) RPDE is broadening its area of activity beyond the original focus on Network Centric Warfare (NCW) rapid prototyping.
- 11) RPDE is unnecessarily Canberra focused. The bulk of RPDE activity remains Canberra based, and thus fails to engage significant expertise from other centres.
- 12) RPDE often undertakes tasks with aggressive schedules, which provide inadequate time to allow access to the most appropriate personnel.

Capability Technology Demonstration Program

13) DSTO now manage the CTD program. They are well placed from a technology perspective for this role, however in terms of linking the CTDs to an operational outcome a stronger link to the DMO and end users, the warfighter, should exist. Additionally, including end users to a greater extent reduces the risk of "technology push". We suggest that consideration be given to the DFCTC's in the CTD process, and whether these can provide "DMO technology pull".

14) Reduction in Funding for CTD program

- a) CTDs are a key mechanism that industry utilises for bootstrapping industry R&T programmes into a demonstrable capability. CTDs fund the demonstration and trial of technologies with the direct support of the defence users. This represents "buy in" from defence, which is an essential part of our internal business case for investment in technology.
- b) Reduction in funding is stated to be due to a lack of transition into service for completed CTDs. The lack of funding has created a "vicious circle" that may undermine the success of the CTD program. Ultimately this has the potential to reduce business investment in technology.
- c) CTDs should be funded to include the necessary operational analysis and in-service trials that demonstrate the capability benefits of introduction into service.

15) Poor CTD transition into service

- a) There is poor linking of CTDs into acquisition programs, nor is there a process of raising an acquisition program as a result of a successful CTD. CTD extension funding is difficult to obtain, even when there is significant level of support from CDG and the forces.
- b) Defence needs to improve its processes for being able to quickly transition the outputs of CTDs into service, utilising similar principles to its rapid acquisition programs.

CDE and Unsolicited Proposals

- 16) There is a need to enable Early Engagement with Industry in the Capability Development Process. Increased involvement or visibility for industry in the early stages of the capability development process will enable more informed and focused expenditure of effort in the pre-RFT stages of an acquisition. There are some current initiatives such as the Land Environment Working Group and various Project Briefings which seek to address this issue, however, even more regular and transparent engagement with Industry will result in more cost effective solutions for Defence.
- 17) Unsolicited Proposals are rarely used to fund development of new capability, but appear to be the only industry engagement mechanism available to CDG other than the CTD process and RPDE.
- a) The unsolicited proposal mechanism is difficult to engage, and poorly funded. The result is that S&T proposals that fall outside the normal budget funding cycle are usually forced to wait for the next round. This can introduce a 12-18 month delay between identification of a need and funding of the program, should it be successful.
 - b) The difficulty in obtaining funding for Unsolicited proposals and CTDs, reinforces the belief that the ADO is increasingly looking to Industry to shoulder all R&D risk for new capability.
 - c) The UK MoD have established the Centre for Defence Enterprise which in many ways is akin to a streamlined CTD process. Proposals are accepted at any time and can either be unsolicited or in response to a targeted call for proposals with specific objectives.

Industry Capability and PLICs

- 18) We question whether there are tangible outcomes of the PLICs. The EW PLIC's stated aims include the design, development and procurement of EW systems from Australia. In spite of the PLIC goals, it is difficult to see the Defence Establishment and the S&T organisations doing much in the way of Design and Development. A good example is the development of ALR2002, which received very mixed support from defence research institutions
- 19) The PLIC aims have an uneasy fit with the procurement policies imposed upon DMO i.e. endorsed requirements. Australian Industry is largely limited to the Adapt, Modify, Upgrade and Integration roles given defence procurement policy. This doesn't take into account that it is extremely difficult for a third party to Adapt, Modify and Upgrade third party systems without considering the cost effectiveness.
- 20) There is an increasing expectation that industry will self fund R&D. With the track record for deployment of Australian developed solutions, and current policy of competing acquisitions on the international market, the Industry Business case is difficult to justify and sustain. This has significant implications on Industry's ability to develop and retain the skill set required for R&D. The BAE Systems PRISM III system was developed on company R&T and it is questionable if, even this successful product, has justified the initial company investment.

University R&D

- 21) Universities interaction with industry is largely ad hoc, and driven by champions both from within industry and the research institutions. It is recognised that universities form the foundation of capability development in terms of basic research and provision of skilled personnel.
- 22) As a generalisation, local universities tend to be difficult to deal with in terms of commercial engagement, the ability to deliver against promises they make, and a lack of commercial focus.
- 23) There is a lack of clarity in the role that Universities take. Much of the research carried out in universities is at a very low TRL level, and yet there is a drive for universities to self fund through the commercialisation of technology.

Cross-Sector Alignment

- 24) S&T priorities across Defence and National Security Agencies are not aligned. S&T requirements from other government agencies (including AGD, Customs, AFP etc) are in many cases similar to those of the ADF, however, there is no consistent or identified set of S&T priorities that span across both Defence and National Security.

Recommendations

25) DSTO:

- a) DSTO plays a very significant role in the defence capability landscape. We recommend against splitting off a commercially focused arm as was carried out in the UK with DSTL / Qinetiq.
- b) Establish a collaborative S&T agenda between Industry and DSTO. Defence will benefit from a closer S&T relationship between DSTO and Industry, as it will significantly lift the level of capability within Australian Industry. Such collaboration should be enabled in identified areas of strategic need.
- c) Bring more consistency to the IP transfer model between DSTO and Industry. Improved visibility of IP created in DSTO, and simplified exploitation paths should be considered.
- d) Consider and budget the cost of transition of technology from DSTO into industry and to an operational capability when funding directed research. As part of this transition, establish better mechanisms for DSTO/DMO handover so that developed products can be introduced into service.
- e) Consider the establishment of an External Board of Review for DSTO. This would enable Defence Industry and Universities to have visibility into and participate in the scientific direction of DSTO. It would also provide Industry and Universities with a voice to ensure that intended objectives and outcomes are useful to Industry and the University sectors.
- f) Share Technology Risk Assessments on major capital acquisition programs with industry once competitive tendering is completed.

26) RPDE:

- a) The RPDE Organisation should be continued and strengthened.
- b) The RPDE organisation should continue the use of "the best person for the task" in a collaborative and transparent manner.
- c) The RPDE organisation should maintain a focus on the IPT approach rather than contracting work packages.
- d) The original RPDE Organisation brief should be reviewed in light of their current activities.
- e) The RPDE Organisation should allow adequate time in tasking to allow part time access to key experts, and the skills development of less experienced staff under their tutelage.

27) CTDs:

- a) A stronger operational focus should be brought to the CTD program.
- b) CTD funding should be increased rather than decreased. The use of funded operational analysis and/or in-service trials to build the capability business case for introduction into service should be considered as part of this.
- c) CTD activities should have stronger links to funded defence acquisition programs. For each CTD project raised, there should be a related acquisition programs, against which funding is committed for the purchase of the CTD outcome should it be successful.
- d) The principles of DMO Rapid Acquisitions should be used to quickly introduce CTD capability into service.

28) Unsolicited Proposal:

- a) Unsolicited proposals should be better funded.
- b) A streamlined process for introduction into service of disruptive technology or new capability should be provided. The current CTD process with its yearly call for proposals and lengthy evaluation timeframe can introduce delays of up to 12 months in the development of new capability.
- c) There should be increased early engagement of industry in pre-RFT activities such as the LEWG and RPDE, with an aim of fostering "high value" Australian Industry involvement in acquisition programs.

29) PLICs:

- a) The scope and role of PLICS need to be clearly defined and communicated to industry. Adequate detail needs to be provided to allow industry to make informed decisions on future capability investment.
- b) DMO's acquisition criteria should be modified to recognise that acquisitions in PLIC related areas are different to those of routine acquisition. Preference needs to be given to PLICs.

- c) Defence, particularly Industry Division, need to commit to Australian PLICs. Such commitment must be reflected in the acquisitions made by Defence to ensure that Industry investment is rewarded. Furthermore, the identified Australian PLICs must be supported by a set of nationally identified, coordinated and managed R&D priorities.
- d) Tax incentives for Industry to fund R&D. Continuation of the 150% Tax R&D Concession should be encouraged. Under the scheme, companies and investment organisations were happy to invest in innovation effort given the immediate benefit of the tax concession, where the longer term returns may otherwise prove to be too risky. This is especially the case in Defence R&D which requires an extremely long investment timeframe.

30) Universities:

- a) Stronger defence related links between universities and industry should be encouraged.
- b) A stronger commercial focus within universities should be fostered – such as prioritised research funding avenues aligned with Defence capability needs and desired outcomes. This could have the added benefit of increased self funding within the university sector.

31) Cross Sector Alignment:

- a) Identify Defence S&T priorities. An identified set of Defence S&T Priorities would enable Industry, University and the Defence sector to better focus Innovation efforts. The US DARPA programs for the delivery of R&D and use of Broad Area Announcements to publicise needs are a useful model to consider.
- b) Align Defence S&T priorities with the broader National Innovation schemes. There is significant overlap between the S&T needs of the National Security and Defence sectors. The identified set of Defence S&T priority areas should be aligned with a broader set of National Innovation priorities to enable effective R&D investment on an effective scale.
- c) Manage Defence S&T investment. R&D investment by all sectors (Industry, Defence and University) should be contingent on its alignment with the identified priority S&T areas.
- d) Establish International Centres of Excellence in Defence S&T. It is recommended that further DFCTCs be established to address other identified Defence S&T needs. It is also recommended that the DFCTC's be built into recognized centres of excellence within their domains. Such Centres of Excellence must be bring together the Australian Industry, University and Defence sectors and be of a critical mass to enable achievements of International significance. Moreover the Centres of Excellence should be focused on S&T efforts aligned with the nationally identified priorities. These could form the basis of "Australia Incorporated" entities in specific capability areas, which would provide a focus for S&T and eventually capability delivery to the ADF.