

RESEARCH TRANSLATION AND INNOVATION
A NATURE RESEARCH EVENT
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CDS ADDRESS

Good morning. Thank you for the introduction.

Dr David Swinbanks, Managing Director Australia, Springer Nature, Chief Scientist

Dr Alan Finkel, fellow speakers, distinguished guests, ladies and gentlemen:

- Let me begin by acknowledging the Ngunnawal (pronounced *Nunnawall*) people, the traditional custodians of the land on which we meet, and pay my respects to their elders past and present.
- I am delighted to be here and to have the opportunity to speak to you.
- As Chief Defence Scientist, my job is to ensure that the best science and technology is applied to deliver innovative solutions for Australia's defence and national security challenges.
- Today I would like to talk about partnerships in defence science and the value we create through collaboration; why partnerships are essential to the opportunities generated by the Defence White Paper, the Next Generation Technologies Fund and our new Grand Challenges program.
- Research is increasingly becoming multi-disciplinary, requiring collaboration between large teams that are geographically distributed, increasingly over institutional and national boundaries. These days it is difficult for single

brilliant scientists to make the big breakthroughs; instead the breakthroughs are coming from excellent teams.

- In the Defence our major projects are complex. Take, for example, the \$50 billion Future Submarine and the \$18 billion Joint Strike Fighter.
- They require management and leadership systems that can deal with complexity, scale, lengthy delivery times, an uncertain political environment, and multiple international stakeholders and collaborators.
- These projects need the successful integration of many technical and management disciplines and the development of novel technologies such as stealth, energy management, and exploiting advances in science and technology.
- We need to have the best people available to help address these challenges. No single nation, let alone single institutions, will have the capacity to provide the required solutions for such challenges. Partners with shared interests and mutual capabilities must collaborate over the long term. Relationships must be built and sustained on trust and not on transactions.
- It is now widely accepted that collaboration is no longer an optional extra; it is a must. In academia, indeed even at 'Nature', the slogan has been 'Publish or Perish'. I contend that it should be 'Partner or Perish'.
- Partnering brings new thinking and ideas through the meeting of different minds and specialties. Done properly, it leads to innovation and productivity.
- The Australian Innovation System Report 2013 from the Department of Industry showed that 63% of firms that collaborated on innovation in 2010-11

(including government research agencies) reported an increase in productivity over the previous year. By contrast, only 32% of firms that did not collaborate showed any improvement in productivity.

- It is undeniable that there are significant economic benefits in delivering projects that result from collaboration.
- Last year we engaged ACIL Allen Consulting to evaluate the economic benefits from 10 of our Defence science and technology projects. It was estimated that the economic returns from these projects was four to five times the budget allocated to DST Group, which is about \$500 million per year. Overall, we created about \$20 to \$25 billion of economic value in the last 10 years.
- Most of the projects that were evaluated were examples of innovation in defence science underpinned by *collaboration with industry*.
- Let me share two examples.
- The Jindalee Over the Horizon radar or JORN which provides surveillance over northern Australia. This world-leading radar capability was developed over 40 years in collaboration with the RAAF, academia and industry. The tangible economic benefit from JORN was assessed to be \$1.5 billion.
- The project was built on basic science and has evolved into applied science. We continue to invest in research to keep JORN as world's best radar of its kind.
- A more recent success story of collaboration involves the Redwing suite of products to counter threats from Improvised Explosive Devices. These were

developed by Defence scientists who worked closely with Australian small and medium enterprises to manufacture the products.

- More than 100,000 units have been shipped to Afghanistan with another 50,000 on order. Last month, Redwing won an innovation award from the Institute of Public Administration. According to ACIL Allen, the benefit arising from this project is in the order of \$51 million.
- However, the cost of saving lives was incalculable. Our technology has saved hundreds of lives and will continue to do so.
- The Abbott and Turnbull Governments, through the First Principles Review and the Defence White Paper, announced a reform of the Defence Department and a substantial new investment rising to 2 per cent of GDP, with \$195 billion of new Defence capabilities to be acquired in the next decade.
- The White Paper announced a unified innovation ecosystem which replaces some 35 different Defence innovation programs. The new unified system centres around a Defence Innovation Hub with a funding of \$640 million over 10 years, a Next Generation Technologies Fund with a funding of \$730 million, and a Defence Innovation Portal which will interface into the innovation system.
- This approach represents a coherent Defence investment strategy for innovation. The programs will consist of large scale collaborative research programs (multi-year programs in the tens of millions of dollars), medium scale programs (multi-year programs in the low millions of dollars) and small scale programs in the hundreds of thousands of dollars.
- The responsibility for managing the forward-looking Next Generation Technologies Fund rests with me and the Defence Science and Technology

team. This is the first time a significant investment is being focused on technologies of the future, with external partnerships a core requirement to deliver game-changing capabilities.

- Defence's operating domains are being transformed by science and technology. These include cyber and electronic warfare, space, undersea warfare, and intelligence, surveillance and reconnaissance.
- While these operating domains are presenting ever-increasing challenges for Defence, there are also opportunities for applying new game-changing capabilities. These include autonomous systems, hypersonics, quantum technologies, human sciences, and material sciences.
- Managing and delivering the Next Generation Technologies Fund is an exciting responsibility - working closely with industry and universities to make a real difference for the future of our defence and national security.
- It is important to understand that the Next Generation Technologies Fund is NOT a grants program.
- We are seeking to build genuine partnerships between Defence scientists and industry, academia and publicly-funded research agencies in tackling Defence's complex technology challenges that defy conventional solutions.
- This will require deep and extensive collaboration across disciplines, organisations and geographic boundaries.

- The projects in this program will embrace technical risk, require co-investment and will create new knowledge that can be applied to produce valuable defence systems.
- When John F. Kennedy announced to the US Congress in 1961 that America would land a man on the moon before the decade was out, he captured the public imagination.
- The secret of the successful moon landing was the work that went behind the scenes.
- I encourage members of Australia's innovation system to come on board with your ideas, your knowledge and expertise and work with us to address our 'moonshot' challenges, such as the \$50 billion Future Submarines Program.
- To deliver on the game changing capabilities identified under the Next Generation Technologies Fund, we will be establishing a Grand Challenges Program to integrate the various strands of multi-disciplinary research.
- A Grand Challenge is a large scale defence or national security problem that is scientifically complex and cannot be well addressed by current technologies, systems or methodologies and therefore requires new concepts or emerging technologies for a solution through a multi-disciplinary, collaborative approach.
- The Grand Challenges – our 'moonshot' program – will allow us to engage broadly with Australia's science and innovation sector.
- The Grand Challenges Program will drive solutions to tough problems similar to Bill and Melinda Gates Foundation which seeks to find a cure for malaria.

For Defence, it could mean high-speed flight at Mach 10, or being able to operate for days without GPS localisation.

- We have organised workshops with industry and academia seeking their input in identifying the audacious challenges that need to be achieved for transforming Australia's defence and national security capabilities. This is still a work in progress and further consultations will be held to refine the concepts.
- The Grand Challenges Program will tolerate failure but it will 'fail fast'. Meaning that it will not wait for years to understand that a new technology cannot be applied to defence needs.
- To achieve our aims we will support small to medium enterprises using the successful US Small Business Innovation Research Program (SBIR) as an exemplar but tailored to Australia's needs.
- Engagement with universities will be a priority. With a national enrolment of more than one million students, 100,000 staff and national expenditure amounting to 1.6 percent of gross domestic product, our universities represent an underutilised resource for Defence.
- Recently, we have developed a Defence Science Partnerships framework to engage universities. This is a novel approach that created partnerships with 30 Australian universities.
- This is a single framework with a set of standardised agreements and method for costing research inputs and sensibly handling intellectual property.
- We have more than halved the average time taken to process agreements and reduced overheads for universities as well as for Defence.

- This arrangement won the best creative engagement award last year from Knowledge Commercialisation Australasia, the peak industry body for commercialising intellectual property.
- When we seek to collaborate with universities we try to match their expertise with our capability needs. For example, we collaborate on hypersonics with the University of Queensland; on hydrodynamics with the University of Tasmania and on physical employment standards with the University of Wollongong because of their respective world-class capabilities.
- The Next Generation Technologies Fund is enabling the Defence Science Partnership model to become an international exemplar for academic support to defence-related research. We have grown our investment from \$8 million to \$20 million in the last year.
- We also need to look ahead and prepare the next generation of scientists to meet the Grand Challenges of the future.
- In Defence, we place a high priority on supporting Science, Technology, Engineering and Mathematics through cadetships, scholarships, apprenticeships and the scientists-in-schools program.
- We believe developing next generation technologies goes hand in hand with investing in future talent equipped with STEM capabilities.
- We have Strategic Alliances for collaborative research with Australian defence companies and publicly-funded research agencies, a total of 14 such alliances. Over 30 research projects are underway or completed and another half dozen are in negotiation.

- The program has been so successful that we are now looking to roll out a similar engagement strategy for small to medium enterprises (SMEs).
- I look forward to working with our partners in industry and universities to realise the government's goals in the Defence White Paper and in the National Innovation and Science Agenda.
- How often have we heard that today innovation is coming out of commercial and academic sector rather than Defence as it used to be?
- Defence science invented computers, the internet and GPS. However, technology development from the commercial sector is now moving at a fast pace.
- Defence recognises that Australia's innovation system has much to offer.
- The message I would like to leave with you – we are at a crossroads. We are well-placed to partner and collaborate. I invite you to join us on this exciting new journey. Let's seize the day for a safe and secure Australia.
- Thank you.