

# PROFESSOR ROBERT CLARK, CHIEF DEFENCE SCIENTIST



Professor Robert Clark was appointed Chief Defence Scientist and Head of the Defence Science & Technology Organisation (DSTO) in September 2008. He is believed to be the first CDS ever to have served in the ADF. After 10 years in the RAN, Professor Clark completed a Ph.D in Physics at UNSW and the Clarendon Laboratory at Oxford. In 1991 he returned to Sydney to establish a semiconductor nanofabrication facility before in 2000 setting up the Australian Research Council’s Special Research Centre for Quantum Computer Technology. He spoke to *ADM* Editor-at-Large Gregor Ferguson.

**ADM:** What did you expect to find when you joined DSTO?

**Clark:** It was clear to me, from my earlier career in the Navy, that DSTO was a very mission-oriented organization and that it had delivered amazing technology such as the Ikara system. So I knew it was capable of doing a lot of projects on a fairly large scale – a larger scale than you would expect to see in a university research centre, for example.

I also expected, like all S&T (science & technology) organizations, to find that there would be peaks of excellence and other areas,

perhaps, where you’d have to look at its relevance. I expected to find the normal degree of variability that you must have in an innovative S&T agency.

**ADM:** What did you actually find? Had much changed in the 30 or so years since you left the Navy?

**Clark:** What I found in the organization really deeply surprised me. I spent about a third of my time when I first arrived doing the rounds of all the laboratories and trying to get a good understanding of the technology. The two things that stood out were, first of all, that just about all of the research was uniformly of a high standard; and secondly I couldn’t find any project that wasn’t directly related to or geared towards an application for the department of defence.

So my impression was that DSTO is a high-performing organization that is really focused on its client base. But that message is fairly poorly communicated back to the clients themselves, and my perception as a scientist working at the innards of the organization wasn’t necessarily the perception of the clients.

But I think it’s centrally a matter of communication rather than substance. Communication is one of the things we are going to work at, to better articulate what we do right across the spectrum. Unlike the US S&T agencies which are segmented into the army, navy and air force, there is just one DSTO to cover the lot, and articulating that breadth and scope of work is not an easy task.

**ADM:** From your experience in the wider scientific community, how does DSTO differ from other research organisations, and how does it resemble them?

**Clark:** I think the thing to realize about DSTO is that it carries out highly classified research in the national interest. It is the custodian of the research that secures the nation, not only in defence but it is also the premier S&T base for non-defence national security agencies. By definition that makes the communication problem somewhat difficult because by definition you cannot, and indeed we will not, talk about what we do deep inside our laboratories.

What I can say on the record is that, in some areas it’s a life-changing experience to see what I have seen. That must be protected at all costs. It is invaluable for the nation. In my opinion DSTO is doing a magnificent job.

**ADM:** That’s an interesting perspective from somebody who’s come in from the outside because most of your predecessors over the past 20 years have been internal appointments.

**Clark:** Quite frankly my report back to my bosses, the Secretary, CDF and Minister, was “This organization is good”. We do not need to fundamentally start change this organization, we need to provide some strategic guidance in certain areas, but it is already a good organization and it doesn’t need a major reform.

**ADM:** Is what you just said going to be reflected in the White Paper and S&T Companion Review?

**Clark:** Look, the S&T Review and the White Paper are strictly under embargo so I can’t say anything at all about either. What I can say is that where I’m heading, I refer to as putting on five degrees of rudder for DSTO.

**ADM:** What are DSTO’s main priorities at present?

## Profile

### Professor Robert Clark

- 1969 Joined RAN
- 1979 UNSW/Clarendon Laboratory, Oxford – Ph.D in Physics
- 1984 University Lecturer, Fellow of the Queen’s College, Oxford
- 1991 UNSW – Professor of Experimental Physics
- 1991 Founded the National Magnet Laboratory and Semiconductor Nanofabrication Facility
- 2000 Founded the ARC Special Research Centre for Quantum Computer Technology
- 2001 Elected Fellow, Australian Academy of Science; recipient of inaugural Australian Government Federation Fellowship for 2002-06.
- 2003 Awarded Australian Centenary Medal
- 2006 Awarded Australian Defence Medal
- 2008 Awarded Eureka Prize for Leadership in Science

Continued on page 56 ►

### ◀ Continued from page 58

Clark: The way I articulate it is that we do four things: One is our support to operations, and increasingly these days we mean Afghanistan. The second priority is what we call support to the force in being: keeping platforms going, keeping them safe, ensuring a capability edge for the Army Navy and Air Force and intelligence agencies. The third sector is what we've just touched on and can't talk about - support to acquisitions. And the last one is long range research.

Broadly speaking, what I intend to do by applying five degrees of rudder is to be very strategic about that last sector - I prefer to call it enabling research - to look at the areas that are close to the tipping point where, if we give them a bit of extra oomph, we can get them over into the first quadrant which is support for operations. There are three or four critical technologies that, if we target and focus and work as a team, we can do something sooner rather than later with our support to operations. That has my full focus.

ADM: Can you say what those technologies are?

Clark: They're basically in areas associated

with counter-insurgency operations: counter-IED operations, and so on. The thing that everyone has to realize is that this is DSTO supporting a Defence Department at war - this is not a peacetime DSTO. That must be at the front of our minds: the safety of our soldiers, their ability to prosecute their mission, their ability to have the most advanced technology that we can provide for them to oper-

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**“We can look at projects such as those developed largely overseas to work out how we can modify them within reason for our needs.”**

ate in a highly dangerous environment - I think about that every single day.

ADM: Is there a case for privatising all or a portion of DSTO, in much the same way the UK privatised much of the former DERA (Defence Evaluation and Research Agency)?

Clark: The UK has gone down that path, that

is their right and I don't pretend to know how successful it was for them. It'd be for them to judge.

My opinion is unashamedly strong - it makes no sense whatsoever in my view to even contemplate privatizing even a portion of DSTO. There are a number of reasons for that: Firstly, we are not a separate organization from Defence - we are an intrinsic part of Defence. So in the acquisition space, for example, we need to be joined at the hip with the Capability Development Group (CDG) and the Defence Materiel Organisation (DMO). The minister has just unveiled the CTD extension program. We are the custodian of those programs and what we are steering through that process must be benchmarked against the needs of CDG and DMO. So we work joined as a single team for Defence and therefore we must be an intrinsic part of the Defence establishment, not a separate privatised organisation.

Secondly, DSTO carries out highly classified research. I read about university academics - and I was one just recently, and maybe I'm a poacher turned gamekeeper - saying "We could do a lot of this work far better than DSTO, or maybe more effectively than DSTO or in a different way than DSTO

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and maybe some of that funding should be deflected towards the university sector.” Again, very strongly, not so: my view is that they cannot know what’s inside DSTO, by definition. I now know what is inside DSTO. That must remain deeply within DSTO.

We should definitely be working with universities, but DSTO has laboratories on a scale that universities do not have. The organization has a 40-year collective knowledge of what has gone right and wrong across the whole of Defence. If you start to play with that resource you’re starting to play with fire. I would respectfully say that perhaps in hindsight if the UK had their time all over again they might themselves have thought about doing it somewhat differently – that’s a very personal view.

**ADM: How much of DSTO’s resources are devoted to major projects such as Air 6000 – Joint Strike Fighter, Future Submarine, Wedgetail, Air 7000, and the AWD and LHD programs?**

**Clark:** By and large in the four major sectors, about 35 per cent of our effort is on the acquisition side. A similar amount goes into supporting the force in being; a good fraction of the remainder is in support to operations, leaving only a small percentage that goes into our enabling research program. I think this latter percentage is a little on the small side. I’m intending to build that up, but in doing so I will take it to the clients and articulate that building up enabling research is for their benefit, and we hope this brings technology closer to that tipping point of direct support to operations.

**ADM: Could we ever go back to the days when DSTO’s R&D program delivered new major defence capabilities such as Nulka, JORN, Ikara etc? Are we likely to see projects of that type, on that sort of scale in the future?**

**Clark:** Absolutely. But it will be done in a different way. I will be disappointed if we as an organization are unable to deliver that kind of capability for the ADF. Look at the success of Nulka, all the ships, both US and Australian and others that it’s now deployed on: we must have an inspirational goal to put our money on a few things looking forward. Indeed, I have my eye on a couple of areas I can’t go into at this point which are very much in this category.

However the days are gone when DSTO can deliver such technology on its own. It’s really important that we work closely with industry, where required. But the key to it, in my view, is our very strong and deep bilateral relationship with the US and wider defence relationships with other nations. I think working closely with our US colleagues on selected projects of scale where we can leverage what we do at the sharp end, and bring the strong

support of our US colleagues to critical areas, working closely with industry, is the model to adopt. That US relationship for DSTO is absolutely essential in my mind.

**ADM: Does that imply another look at how DSTO works with industry at the moment? The mechanism for extracting IP from DSTO and commercializing it is very much a second order issue for DSTO and a lot of people don’t find it an easy thing to achieve.**

**Clark:** I think DSTO’s very aware of the need to engage with industry. But also we have to be mindful of our clients and the need to protect our intellectual property, though not to the extent that it inhibits a strong interaction with industry. My view about protecting our IP is the exact opposite: it’s about getting an IP environment that is conducive for industry to engage with you and to have the right legal framework where we facilitate that interaction rather than deter it.

It’s fair to say that in a lot of things DSTO

look at projects such as those developed largely overseas to work out how we can modify them within reason for our needs.

**ADM: What was behind the recent appointment of Dr Nandagopal as head of DSI-TA? Was that an initiative from you, or from DMO?**

**Clark:** Actually it was a joint initiative, triggered in partnership with my colleague Steve Gumley. The biggest issue facing us in the acquisition space, and even in the area of counter-IED where you’re bring in lots of technology to bear, is systems integration. There are two types of systems integration: vertical, where you take a particular platform and look at how the combat data system integrates with the weapons and sensors for example. And even more challenging is horizontal integration where you’re taking, let’s say, a communications system and you want to network that across a range of ADF platforms in the land, sea and air environments.

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does this is not a priority, but on selected projects, and I believe we maybe need to choose one, perhaps two where we decide to really go in deeply, in those areas we’ll have to be very cognizant of the need to vigorously engage with industry.

**ADM: Any pointers to the sort of technology areas you’re looking at?**

**Clark:** I’d prefer not to comment at this stage. We haven’t fully locked into our decisions yet, and we won’t fully lock in until I’ve got the endorsement of my Defence colleagues. But we need to make those decision soon and when we lock in, stand by. We can’t do everything and we need to decide what are the one or two really serious things we want to do which could make a genuine difference, where we can make an innovative contribution to Defence.

**ADM: How far is a relatively small country like Australia able to verify and validate the operational capabilities of platforms developed overseas like the F-35, Hobart-class destroyer, Wedgetail, Global Hawk, Canberra-class LHD etc? Can we really be a smart buyer?**

**Clark:** This is the remarkable thing about DSTO that I’ve learned since coming into the job: DSTO is very plumbed in to the details of these projects, and it runs its own independent experimentation and modeling. It’s a national asset –it provides solid technical advice to government, not just on technical risk but on capability and the capability edge. We can

So how can we de-risk our acquisition programs so that we don’t come unstuck way down the track? We want this advisory group to look at the key issues right at the very outset, very much in line with the recommendations of the Mortimer Review – mainly how to de-risk the acquisition process at the pre-DCP stage by channeling more resources into key issues.

Nanda has had a lot of experience in this area. I’ve been talking myself to universities in South Australia: there are many projects in those two universities [Adelaide and South Australia] looking at systems integration and our issue is to bring them together in a cohesive way so we can invest in a single entity and develop critical mass in a source of advice to the DMO at that pre-DCP phase.

Not only looking at the technical issues but also the capability and capability edge issues. Seconding Nanda at the highest level into DMO will ensure we work together. We intend to leverage off our university colleagues to build that up, starting with some carefully chosen acquisition projects so that as the White Paper unfolds we are well placed to expand.

We haven’t got a fixed idea of how that will evolve yet. It needs to evolve in a way that is meaningful for the DMO and that provides advice in the right manner and the right areas, and working on the right tasks to be useful. \*