CAF SPEECH TO WILLIAMS FOUNDATION DINNER 29 May 14

In March this year I spoke at the Williams Foundation Seminar on combat operations in 2025 and beyond, and I actually said then that most of what we'd have in 2025 was in place. It's nice to be here at the end of May and say that it's now all in place. We will have a combat fleet of JSFs supplemented by Super Hornets. They will be well supported by systems like Wedgetail, Growler, KC-30, and air defence systems like Vigilaire and over-the-horizon radar, and I even think the Maritime Patrol Fleets, P-8s and Tritons, will all contribute to the air combat system.

All of those capabilities will enhance not only the air combat force, but the whole ADF. Now, each system by itself is inherently a very capable system, but they were designed to be used as integrated systems, and they will fundamentally change how Air Force interacts with Navy and Army and our allies.

In the previous speech at the Williams Foundation I said that just having an F-35 doesn't confer an air combat capability on us. We need to employ it as a system of systems, and we need to develop the concepts and tactics on how to use it best. It's vital that we actually embrace that change.

Now, I'm going to illustrate a couple of stories where sometimes we've been a little slow to embrace the changes in technology in the Air Force - and I'd argue the Air Force is usually a pretty forward-thinking organisation. I can give you plenty of examples where we've been very innovative in our thinking. But I'll give a couple of examples of the dangers that we face with the F-35 coming in.

I had the great fortune to convert from the F/A-18 to the F-111 quite late in my career – I'd spent about ten years on the F/A-18 – and got to fly the F-111, which is a magnificent aeroplane, and it had gone through an upgrade program called the AUP. Fundamentally, that upgrade program had been sold as a maintainability issue so that we could actually keep the aircraft for longer. What it had actually done was replaced the analogue avionics with digital avionics. One of the first times I got to fly it was on an about 1,000 nautical mile mission, all at low level. The one thing that sort of surprised me was about every 70 to 80 miles we'd go over a feature, as a turn point – so as we went, we did about 12 turn points – and this seemed a little strange to me, given the modernisation that had occurred in the aeroplane. So I asked the team "Why did we put so many turn points in this mission?" And they explained to me, in all seriousness, that in the old jet that had an analogue inertial navigation system, if you didn't update it every 70 miles, the system would drift off. I said, "Well, what bit of two laser ring gyros and twin GPSs haven't we got hold of?"

Now, I should caveat that, I came to this aeroplane just after the AUP was completed and for while we had a mixed fleet, when we really hadn't thought through the advantages of it.

The other one that really surprised me with the F-111 was that, after coming from the F/A-18 and having a head-up display and all these multifunction displays for the past ten years, I hopped in the F-111, where there were two multifunction displays courtesy of the upgrade program, and I thought "Wow, this is good." And the first time I flew it I looked at what was actually displayed on the multifunction displays and thought, "Hmm, this isn't actually much good for a pilot." It was great for the navigator, 'because he had to interpret whatever hieroglyphics were on these multifunction displays.

And so I flew the aircraft for another couple of months and thought about it and thought, "Well, you know, this aircraft's actually got a digital backbone. Why can't we display the same things on the F-111 that we do on the Hornet?" And one of the great advantages of the Hornet was that it had a situational awareness display, so you could just actually look down and you could see your track and you could do everything like that. On the F-111 you had a rolling set of lats (latitudes) and longs (longitudes). Well, guess what, in the analogue version they had a rolling set of lats and longs as well. And, luckily, we had a software development cell for the F-111, and the guys were quite competent, so I walked up one day with my little picture, out of my OCU notes, of a situational awareness display, and I hopped in front of the co-developer and said "Look, why can't I have one of these on the jet?" and he said "Well, you can." I said, "Well, why don't we have one?" "Well, nobody's ever asked us." And they basically said it was easy to achieve. It wasn't quite as easy as they said – it took us about six or seven months to actually do it. But I just put those two points out there to illustrate that we can often be constrained by previous mindsets.

Now, I hasten to add that we weren't totally Neanderthals in the F-111 world. We did a lot of great, great things. We did Pave Tack reconnaissance ten years before it was invented by the United States Air Force, as non-traditional ISR. On the F/A-18, we had swing roll F/A-18s well before the USAF thought about it. But we were still constrained when we actually introduced that aeroplane.

It's been interesting with the Super Hornet. When we first introduced the Super Hornet with the AESA radar, we basically said to ourselves, "Well, it's a Hornet with a radar that detects things at three to four times the range."

We were really lucky that the USAF had given us some slots on the F-22 and, a further bit of amazing good fortune, that our personnel people actually posted the people back into Super Hornets after they'd flown the F-22. It doesn't always happen. The influence of those guys on the Super Hornet tactics very much changed the way that we use the aircraft and actually accelerated us quite a bit. I'd like to point to an interesting quote by Lieutenant Colonel Chip Berke, who was at the Williams Foundation Seminar. Chip is experienced in the F-22 and he's an experienced USMC F-35 driver, and the most interesting quote in the Williams Foundation to me was when he said "The F-35 doesn't replace anything. If you look at the F-35 as a replacement for the Hornet or the Super Hornet, you will undermine from day one the real capability of this aircraft. It does not replace anything. It is unique, it is revolutionary, it is in a world never before defined by tactical platforms. Legacy aircraft are tactical platforms that make tactical decisions and fly tactical missions that impact the overall strategic objective. I believe there is a requirement to view the F-35 as a platform that can operate across the spectrum from tactical to strategic or anywhere in between, as required."

I think Chip highlighted a really key opportunity, not only for the Royal Australian Air Force, but I think also for the whole Australian Defence Force. Can we transform the way we fight? It certainly increases the capability of legacy platforms and, if I was to quote Chip again, "the only thing better than four F-22s is four F-22s and four Hornets. Better for the Hornets and better for the Raptors."

So, if I was to paraphrase it in terms of where we'll be, what's better than four JSFs? It's four JSFs and four Super Hornets and maybe some Growlers and Wedgetail and our Air Warfare Destroyer. You know, as we go forward with the F-35, the things that we've got to be able to do is integrate seamlessly with capabilities like the Air Warfare Destroyer and also the Anzacs that have got the new AESA radar. I'm an absolute fan of the work

that CEA has done on those Anzac frigates. It is leading edge technology. I think the combination of the aircraft and the ships, will be absolutely critical for dealing with the sort of threats that we'll face. And there's enormous opportunities even in BMD if we can get that seamless integration.

So, on the 23rd of April the Government did make the decision for the additional 58 JSF aircraft, which takes us to 72. The first one rolls off the assembly line next month. What this means is that we actually don't have a lot of time to start thinking through these issues and doing the work that we need to do – to change the way we operate, change the way we train and change the way we actually support the Force. We've actually got to start from this moment on, to stop thinking about an individual F-35 program. We need to have a look at it as not only an integrated air combat system, but what it means for the ADF and, I'd argue, the Australian Defence Organisation.

What I'd like to do is just briefly work through the value chain of the F-35. I'll start in operations and I'll work my way towards fundamental inputs to capability, and we'll just have a bit of a look at some areas that we could change. I almost get a hoarse voice trying to explain to people why 5th generation capabilities are important in the F-35 and why speed and manoeuvrability don't necessarily have the same impact that they previously had. So what is 5th generation? It's low observability, it's a low infrared signature, its low electronic emissions, it's an AESA radar, it's the data links associated with that, but the most important thing in my mind that the JSF brings is the fused picture – that situational awareness that it actually brings to the operator.

Now, we say those words - situational awareness - a lot, but not many people actually define what it means. So when I talk to the team about it, I draw three diagrams, and it describes what has happened, what is happening and what might happen. And your level of situational awareness is a combination of all those things. If you look at the difference between an F-35 and a legacy platform, you don't have to manipulate the sensors. You've got a fused picture on the display, you don't have to have as much communications between the flights; the pilot's fundamentally got a lot more brain space to actually look at the tactical situation and go forward.

One of the things that the critics of the F-35 don't get is, in all the studies of air combat, the amazing statistic is that 5% of the pilots have taken 95% of the kills. Now, when you do the analysis of those 95% of the kills and what makes the difference with those 5% of pilots, it was their superior situational awareness in all the situations that they faced that made the difference. And the F-35 gives you a massive leap in situational awareness, and that's **the** key factor in 5th generation capability. It's the integrated fused picture.

Now, we're already seeing some of that in the rest of the ADF. We're successfully fusing the picture between Wedgetail and the Navy. One of the great decisions we made with Wedgetail was that on each one of the crews there's a Navy Air Intercept Controller – I've got one Mission Commander who's a Navy Lieutenant Commander at the moment – and our recent experience on some exercises with the Super Hornet and Wedgetail have really shown the power of that integration.

Now, I have been thinking about the JSF. When we look at the tactical situation, the things you need to do are you need to be able to find, fix, track, target, engage and assess. That's the cycle. The JSF can do that all by itself, but it is far more powerful if you look at the find and fix and you use a lot of the systems we've got from Vigilare to JORN to SBIRS, to maybe even the Triton and P-8. They're all part of that find and fix. And if I was to look at track – Wedgetail, AWD, Growler are all parts of that. The engage

– well, that's the job of Super Hornet, JSF and Growler, and maybe, if we really get far enough ahead, some integrated fire control with the Navy. That's all well within the realms of possibilities. The more nodes you've got, the better off it is for the entire system. And what the JSF does is it increases the capability of the entire system.

We need to be able to share that situational awareness right across the network of the ADF, right down to the soldier on the ground. You know, it is the battlespace awareness that actually enables the most capabilities. The trick for us is to get the right information to the right person at the right time.

Let's just step back and have a look at the Air Operations Centre. That's actually core to the way Air Force does business. But I think, as we go forward, it's one of the areas that we need to change. In 1991 the Air Operations Centre was great for warfare where you could have a separate air campaign. By 2003, and having been right in the middle of it, it was a pretty clunky system. It's probably still a pretty clunky system. In 2003 the dynamic nature of the initial operations in Iraqi freedom meant that we were writing an air tasking order and on a daily basis we were changing 60 per cent of the tasking on the floor. If we continue with the same sort of construct on the AOC, with capabilities like JSF and the level of integration that we can get to, we're fundamentally not going to get the best capabilities that we can out of that jet or any of the other supporting systems.

But I think probably the biggest change that I've seen at the operational level – there's been a big change in the accuracy and flexibility of kinetic weapons – but the biggest change that I've seen in the last ten years is in ISR - intelligence, surveillance and reconnaissance. We don't even talk about it in terms of three separate words now – it's become like radar. It's ISR.

And I saw a fantastic example of that on a visit to Washington one day at Langley Air Force Base. I happened to be out there at their DGCS when the Libyan Operation was going on, and what's happened with intelligence is that it's actually been totally operationalised. It is there in real-time at the moment supporting the war fighter on the ground. So I was actually behind these three operators – they had three large screens in front of them – and there was a Reaper feed coming in. There was an armoured vehicle that the guys operating out of Creech couldn't identify as to what sort of vehicle it was and had problems declaring whether it was hostile or not. So, back in the intelligence section was a guy on the right hand side who was actually trawling through all the United States national databases to actually identify this vehicle in real time. That's the sort of capabilities that are there.

We've established some of that nascent capability at Edinburgh on a joint project down there – it's a pilot program - but let me tell you the level of integration that we've got at the moment. I call it swivel chair integration. In front of these guys are six separate systems. So, to actually get an answer, an intelligent answer, they've got to potentially data mine six separate systems. So, when you do the analysis on it, my analysts, highly trained analysts, spend 75 per cent of their time looking for the information and only 25 per cent of their time actually analysing it. The thing we've got to change there is we've actually got to reverse that. And we can do that. I think DSTO has done some great work in that particular area. The systems are there. We just need to work through the projects to get it.

The Defence enterprise itself has a lot of seams. Certainly, within the strategic agencies we've got to look at that. The technical and policy differences have really got to disappear if we're to truly get the value out of these 5th generation systems. The glue

projects, like JP-2096, are fundamentally important to actually getting the best out of that aeroplane. We need to go from those six separate systems into an Intel cloud that we can actually pull the data through. The capability is out there. We just haven't driven ourselves towards it fast enough.

Preparedness was the other issue that I think we can make some real gains in with the JSF. The pilot has no longer got to be a sensor operator and a fuser in his head. What that means is the fighter pilot in a JSF will be much more capable much earlier than previously, because of the fused nature of the system. On average, I think most of the F/A-18 pilots around here would admit you really only truly became a capable 4th generation fighter pilot after about 500 hours. In JSF we can probably do it in maybe 150 to 200 hours.

And just to give you another example of the change, I talked about the exercise that we'd recently done with the Super Hornets. We had a very high end exercise probably two or three months ago. The Super Hornets went up against an aggressor force, a very high end aggressor force, and the result was 210 victories to ten. Now, for all the older fighter pilots in the room, if we did better than seven to one we thought we were having a pretty good exercise.

Now, that is just the difference with changed tactics and an AESA radar. The JSF will be far superior to that. But how do we train? And here's the issue – an AESA radar on an aircraft actually means that in the live environment you have a lot of trouble challenging the aircraft. You know, simulation is absolutely key to getting the best out of these new capabilities. And a combination of live and virtual is where we need to go.

I think, from a whole of Defence Force point of view, simulation has got to get a much bigger focus than we've got at the moment. It just can't be on individual platforms. We've got to create an integrated simulation environment if we're truly going to move into those 5th generation capabilities.

And probably the other area as I move further back the value chain is in capability management. Now, I'll put a rider on before I say the next few words so I don't offend too many colleagues in the room. Defence is staffed by some of the most talented and committed people that you'll meet anywhere in the world, but we are really hamstrung by the organisational structures that we put those people in. And I think we've seen in some of the significant challenges we've had with the functional supporting silos, they aren't necessarily well aligned to our capability outputs. We've seen the manifestation of underinvestment in the infrastructure, and I really think the first-principles review of the Defence Organisation is an enormous opportunity for Defence if we take a different mindset into it. There are examples of some incredibly innovative acquisition organisations. Diggerworks I think is a great example of how we could and should do work.

We've got to fundamentally move away from an industrial acquisition process. It's way too slow to actually keep up with where we need to be in the future, and it will not keep up with the capabilities of JSF and Wedgetail and what we need to do in the future. We're hamstrung. Its like the frontline's got an iPad and the rest of us are working on an Apple II, because of our organisational construct.

I often talk to my COs and I talk about the difficulty of actually getting anything done in the Defence Organisation. And I use the example "It's like having a whole lot of corks in water in a bucket." And so what you've got to do is you've got to identify every

stakeholder (cork) and then you've got to put your hand over all those corks and keep them down for the entire time that you want to do something. If one of them pops up, you're going to have to start again. And I think a lot of people in this room can actually understand that sort of description.

Probably a worse indictment for us is - if I don't want something to happen in Defence, my tactic is to send it on whatever process we've designed, because that is an absolute guarantee that it will not succeed.

Like I said, the first-principles review is an enormous opportunity. The threat here is the high priests of centralism. I'm not seeing it at the moment, and I'm very encouraged by Brendon (Sargeant), by a lot of the work that you're doing, but, in general, centralism has a stranglehold on management thinking, not only in Defence, but I'd argue in even big corporates as well. The best way to get something done is to form a small team. This whole idea, the litany that they come up with, of economies of scale – that they prevent duplication – it just fundamentally doesn't work and it's never worked because it just doesn't go with the human dimension of design. The design that you put people in fundamentally affects the human psyche: it affects their spirit. Highly centralised organisations cannot produce the results that small teams do.

That's probably enough preaching from the pulpit on that particular subject. But, we've already started a number of moves within Air Force to transform ourselves and be ready for this capability. We've fundamentally started to change the way we deliver combat support we've changed the way we deliver maintenance, and, importantly, we've started to look at a mid-term transformation plan which I'll call Jericho. Now, we've named it Jericho for a couple of reasons. There's the biblical reason, but more so, the appeal of the name for me was the Allied Operation by 464 Squadron into France, where they knocked down the walls of the prison, the Gestapo prison, for the French Resistance; breaking down walls was central to the success of Operation *Jericho*. Breaking down the walls and breaking down the stovepipes of Defence is central if we're actually going to realise the full capability of 5th generation capabilities.

I hasten to add here, it isn't a single service issue. We'll work very closely with Army and Navy on how we transform, because that superior situational awareness is not only for the guy in the cockpit of the F-35; it's for the combat team in the AWD or the Anzac frigate, and it should also be for the combat team on the ground.

Now, my appeal here, with such a big industrial base here, is that we actually need industry to help us in the development of this plan. There's a lot of great technology being developed out there and I think it's essential that we partner with the industrial players so that we can maximise the opportunities of that 5th generation air force. In lots of ways, who better to engage than the people that actually designed us a 5th generation system?

For industry, you need to consider how to work with us, not just on a platform basis and not just in terms of an RFT (request for tender); we need help with the intellectual horsepower of thinking through how we actually maximise those 5th generation capabilities. If we don't break down those stovepipes and walls that exist, I think we'll be fundamentally missing a great opportunity that we have with the new technology that we have presented before us. Right now, I feel as though I'm flying that digital F-111 and nobody's shown me exactly what we can achieve.

Thanks very much.