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JOINT STANDING STANDING COMMITTEE ON

FOREIGN AFFAIRS, DEFENCE AND TRADE

Defence Subcommittee

Friday, 31 March 2006

Members: Senator Ferguson *(Chair)*, Mr Edwards *(Deputy Chair)*, Senators Bartlett, Crossin, Eggleston, Hutchins, Johnston, Kirk, Moore, Payne, Scullion, Stott Despoja and Webber and Mr Baird, Mr Barresi, Mr Danby, Mrs Draper, Mrs Gash, Mr Gibbons, Mr Haase, Mr Hatton, Mr Jull, Mrs Moylan, Mr Prosser, Mr Bruce Scott, Mr Sercombe, Mr Snowdon, Dr Southcott, Mr Cameron Thompson, Ms Vamvakinou, Mr Wakelin and Mr Wilkie

Defence subcommittee members: Mr Bruce Scott *(Chair)*, Mr Hatton *(Deputy Chair)*, Senators Bartlett, Crossin, Ferguson *(ex officio)*, Hutchins, Johnston, Payne and Scullion and Mrs Draper, Mr Edwards *(ex officio)*, Mrs Gash, Mr Gibbons, Mr Haase, Mr Snowdon, Dr Southcott, Mr Cameron Thompson, Mr Wakelin and Mr Wilkie

Members in attendance: Senators Ferguson, Johnston and Scullion and Mr Edwards, Mr Hatton, Mr Bruce Scott, Mr Cameron Thompson and Mr Wilkie

Terms of reference for the inquiry:

To inquire into and report on:

a. the ability of the Australian Defence Force to maintain air superiority in our region to 2020, given current planning; and

b. any measures required to ensure air superiority in our region to 2020.

WITNESSES

Subcommittee met at 9.30 am

KOPP, Dr Carlo, Private capacity

GOON, Mr Peter Anthony, Private capacity

CHAIR (Mr Bruce Scott)—I declare open this public hearing of the Defence Subcommittee of the Joint Standing Committee on Foreign Affairs, Defence and Trade. Parliament's Defence Subcommittee is conducting a public inquiry into Australia's Defence Force regional air superiority. The committee will be reviewing issues relating to the maintenance of Australia's regional air superiority. Australia's decision to participate in the Joint Strike Fighter program, upgrade its FA18 Hornets and retire the F111 fleet by 2010 has raised the issue of ensuring that Australia maintains regional air superiority into the future.

The committee will take evidence from the Commonwealth Department of Defence, as well as a range of private individuals. Before introducing the witnesses, I remind members of the media who may be present at this hearing to the need to fairly and accurately report the proceedings of this committee. I now welcome our first witnesses, Mr Peter Goon, the Managing Director of Australian Flight Test Services, and Dr Carlo Kopp, a lecturer at the Clayton School of Information Technology at Monash University. Is there anything you would like to add about the capacity in which you appear?

Mr Goon—I want to make a correction. I am no longer the Managing Director of Australian Flight Test Services; I am the chief executive officer. The organisation has ceased being a proprietary limited company.

CHAIR—Thank you. Although the subcommittee does not require you to give evidence under oath, I would advise you that these hearings are legal proceedings of the parliament and therefore have the same standing as proceedings of the respective houses. Would you like to make an opening statement to the subcommittee?

Dr Kopp—Yes, we would. The importance of the matters before this committee today cannot be overstated. If this nation makes the wrong choice in coming months, Australia's strategic position in this region, and its capacity to act unilaterally in regional conflicts, will be damaged for the next thirty to fifty years. Its political power and influence in the region will be significantly reduced, if not made inconsequential and irrelevant. Moreover, the wrong choice would see well over 15 billion dollars of taxpayer's funds squandered, thus adding insult to injury. Repairing the damage will cost about the same amount of money again

Fundamentals must take precedence over fashion. The fundamental purpose of the ADF is defending Australia. Put aside all the pointless and sterile arguments about forward defence, mainland defence, what was known as the 'defence of Australia' and similar theories. Whatever the argument, the fundamental military tenet is control of the high ground. In contemporary military affairs, that equates to being able to guarantee control of the airspace over assets of critical importance, whether they be ADF land or sea forces, ADF strike aircraft going in to take out enemy targets or vital assets of the homeland. No Australian force since 1943 has had to operate under hostile air power, with the possible qualification of Korea. One could be forgiven for thinking that some Australian military planners take air superiority for granted.

The strategic reality Australia faces today is that of a region soon to be awash in advanced military technology. While China and India have spent the most, smaller regional nations have followed with similar or identical buys. For the first time since the end of the Cold War, we are seeing the development of military capabilities of a technological level and numerical strength to perturb the unchallenged advantage held by the United States since 1991. For an underfunded ADF, the potential disparity is enormous.

The pattern seen in Asia reflects a mirror image of US force structure, with acquisitions of long-range high-capability fighters, airborne early warning and control aircraft, aerial refuelling tanker aircraft, cruise missiles and a wide range of smart munitions. Asian nations are developing the same capability to coercively project power, which until recently was the sole domain of the United States.

As a sovereign nation, Australia's first requirement is to have the means to act independently when its essential interests are challenged. Such means also provide for valuable contributions where treaty obligations with the US or other allies must be honoured. The recent US Quadrennial Defense Review paints a picture in which future US air power is reduced numerically and recapitalisation of Cold War era aircraft fleets struggles for funding. The United States will be challenged to respond quickly in strength should a contingency arise in this region which Australia cannot deal with alone. If Australia cannot demonstrate to the region decisively that it can achieve air superiority where and when it needs to, it will face all of the risks that arise in a marginally stable region—a region which is arming itself for a new millennium in a world of intensive trade, sociological, economic and military competition.

Denied demographically the possession of large ground forces to match countries in the Asia-Pacific region, Australia has relied mostly on deterrence since the end of the Second World War. That deterrence is and will be mediated via air power. If air superiority is unable to be guaranteed then that deterrence will be lost. Technology is very important in all aspects of military affairs. In air combat it is absolutely crucial. No amount of training or courage can compensate for a design of inferior capability. Nor can such a deficiency be made up for by larger numbers of second-rate equipment. There are no prizes for coming second.

To achieve and maintain air superiority, Australia needs a fighter aircraft that cannot be challenged over coming decades by systems like Russian Sukhoi aircraft or S-300 air defence missiles. This fighter must be supported by highly capable long-range strike, intelligence reconnaissance surveillance, aerial refuelling and electronic attack capabilities. There is only one multi-role combat aircraft in production today that meets this benchmark. This aircraft is the F22 Raptor, now operational with the US Air Force. This aircraft is so capable that single F22s decisively win against multiple legacy fighters.

While the joint strike fighter is being marketed as a multi-role fighter, it is being developed mostly to hunt battlefield targets, with air defence as a secondary role. Otherwise the United States would not have built the F22 Raptor. As a result the joint strike fighter will have limited performance, limited agility and limited stealth compared to the F22. Put simply, it is too small and its performance and stealth will not be good enough. We propose to deal in question time with the canards that the F22 is unaffordable, a single role platform and not for sale.

The prestigious US General Accounting Office concluded after thorough analysis that the business case for the joint strike fighter was unsupportable. The plan to manufacture hundreds of these aircraft well before the completion of testing is unprecedented and will drive up costs for those who commit early. Even Defence, who stridently maintained for years that the joint strike fighter would be delivered on time and on budget, now concedes this is no longer so. Given the aircraft has still not flown, it is naive to gamble so much on an unknown outcome, as our colleagues in Defence are intent upon doing.

We concur with the assessment by the General Accounting Office that the current plan for the joint strike fighter is unexecutable. The risks to the taxpayer and participating industry are extreme. The business case for life extension of the F/A-18A is no less defective. To extract a very few years of additional life from the F/A-18 fleet, the taxpayer will have to invest over $3 billion, with no long-term return on investment. This money will be totally lost.

Furthermore, a large fraction of the fleet will be in the workshops and unavailable while structural and other rebuilds are performed. Cost and schedule overruns are certain. For what result? We still end up with an obsolete platform as a fighter. This is no different to Qantas going back and refurbishing Boeing 727s for mainline service. The justification for the Hornet upgrades is unsupportable from a budgetary or engineering perspective.

Early retirement of the F111 and the resulting diversion of F111 funding to the FA18 is provably a blunder of multi-billion dollar proportions. The failure to perform due diligence on costings extends much further. The cost of attempting to substitute small aircraft like Joint Strike Fighters or FA18s for larger aircraft like F111 and F22s results in much increased demand for aerial refuelling support, with commensurate increases in capital and direct operating costs. In analysing costs, Defence has opted to ignore the big picture and, by doing so, hide the true cost of fielding this operational capability.

Since 2004, Defence officials have played a systematic avoidance game in this debate, avoiding debate on hard facts, numbers and issues. The independent experts who have invested much time and effort to expose the flaws and weakness of the department's current plans are being portrayed as the enemy or perhaps somehow as being in competition with Defence. This is bizarre. Given the national importance of Defence, it is quite proper for it to be a matter of public debate. It is quite proper for Defence to defend, in detail and without evasion, its proposals in public and be prepared to acknowledge and accept criticism and change where appropriate. The responsibility now falls to the parliament to see that this is so.

Invariably, a cloak of secrecy invoked in the name of national security is drawn as a curtain across detailed discussion, despite such obvious failures as the Sea Sprite and Collins programs. Classified technical details have little bearing on big picture issues such as program funding, program risks and regional capability standing. The proposal that the Joint Strike Fighter, even if it attains its design specifications, could serve effectively as an air superiority fighter and guarantee air superiority against regional powers is simply wrong. Australia must have the best, not the second best. National security and the legacy we leave our children demand it. The department's proposition is one that the Rt Hon. Sir Robert Menzies, who bought the F111, would never have countenanced. That concludes our opening statement.

CHAIR—I now open the inquiry to questions from the committee.

Mr HATTON—The first question is probably a bit hard because, despite what you have put in your counterarguments as to what Defence is proposing to do, I am unsure about where you are coming from in this. In some of the documentation that I got originally there was copyright information which argued intellectual property rights and indicated that, if any material change were made, there might be an intellectual property rights claim made in relation to that. Given that a lot of people are providing not only evidence to the committee but also information to Defence and that initially you were part of the Air 6000 exercise, it would be useful for me—and I think for the committee and people at higher levels—to know whether or not there is a potential stumbling block in the argument you have advanced with regard to the commercial interest you might have or the implications of that copyright notice, because it is a very unusual one and it drew my attention very strongly. Is there any cost? Would there be any claims on Defence if they actually accepted your argument for the extension of the F111 and the Raptor programs? Could that be a blockage in terms of them not pulling back?

Mr Goon—That is one of the reasons why we find this whole situation somewhat bizarre. It goes to where we started with this. This started as a response to a request from Defence for industry to come up with innovative and cost-effective solutions to our defence capability needs. It was formalised through the Air 6000 process, basically put forward as a response to a request for a proposal and followed up with a range of unsolicited proposals. We have been accused of having pecuniary interests in this as if there is something wrong with industry members of the Defence community putting forward proposals. That is almost as bad as saying that people who respond to requests for tenders have some insidious or surreptitious reason behind it.

We are industry, or certainly I am industry. My company and the other companies that I worked with back in 1999, 2000 and 2001, and my work with Dr Kopp here, developed what was called the evolved F111 option in response to a request for a proposal. Much of the material that we have used and put into the public domain has come from that process. There is a significant amount of proprietary information which still resides within defence as part of the unsolicited proposals. We expect to be treated like any other industry member who puts forward a proposal. We expect our proprietary commercial-in-confidence information to be protected and, if it is found that what we have put forward is valid and valuable, we will be rewarded for the work that we have done and, hopefully, be engaged to assist in the effecting of the process.

Mr HATTON—So there might be a stumbling block in terms of people reacting to it. The fundamental argument you have put with regard to extending the life of the F111 and buying in the Raptor as the second piece instead of very costly changes to the FA18 is pretty strong. Other people have indicated just how strong that Raptor is, including the Chief of the Defence Force, when he wrote a strategic insight paper. Is the core of the situation part of the problem of where we are in relation to the decision making? The Air 6000 process, from all I can see, was abbreviated in a way that I do not think we have had any precedent for in terms of major defence buyers, particularly with a project of this magnitude, so that those who are with you and who are in that process of assessment continue to take their argument forward because there has been a decision by Defence to say, 'Bang, that's it,' and the former Minister for Defence said, 'We're going with the JSF.'

Mr Goon—That also goes to the proposals. We put forward a force structure option in its own right. It was also put forward as what we call 'an independent verification and validation model', which means that basically it is a tool for comparing, through an evaluation process, other force

structure options. There was no doubt that ours was a commercial proposal, but it was also based upon a national interest issue—that is, we want the best for Australia in force structure, in terms of defence capability. We looked at that from a variety of different directions and put in a considerable amount of effort in analysis and reporting. We came up with what we thought was, and we still think today is, the most cost-effective optimal option for Australia in air power force structure in relation to the air combat capability requirement.

Mr HATTON—Dr Kopp, you may be able to assist me with my fundamental question in all of this—that is, Defence's response to the arguments with regard to the F22 Raptor, which is a true fifth generation plane, has far more legs than the JSF, which is still of course a paper plane. Its fundamental argument is that a new network-centric defence capability with air refuelling, AWACS, some satellite and JORN as a package will allow the JSF to be as capable as we can get. I cannot understand why, at the centre of that network-centric defence, you would not have a more capable platform, which I think is the centre of your argument. In all the reading and preparation I have done for this, I cannot find an answer to that, and Defence do not seem to address it.

Dr Kopp—To put this into context, I am one of the few people in Australia who has performed genuine academic research on network-centric warfare and also the technology from which these networks are built, to the extent that my doctoral thesis was actually on the adaptation of fighter radars for long-range networking. I am probably the best qualified person in Australia to comment on this.

The root of the problem is that Defence have misunderstood the relationship between capability and networking. If you look at the capability of any package of military aeroplanes or any package of military equipment, the damage you can do to an opponent is primarily determined by the capability of your platforms—how many missiles, bombs or other weapons they can carry; how effectively they can punch through an opponent's defences; how effectively they can defeat individual enemy platforms. What the network provides you with is what we call situational awareness or improved situational awareness. In other words, the network allows you to look at a bigger picture than the sensors on your platform alone would permit you to view. But that in itself simply gives you a few more firing opportunities or evasion opportunities when you are fighting an opponent; it does not fundamentally change the amount of firepower you can deliver.

This is a very deep and fundamental misconception in how Defence think about this. I have raised this with them repeatedly in the press. In fact, I challenged them on this issue 18 months ago in the submissions that we put in for the Defence annual report, and I have published at least one research paper for a conference and one journal paper that deal with this in considerable detail. Defence as an organisation have simply not responded to this. I find this just astonishing, because the mathematics here are completely unambiguous, and commonsense supports that.

To take this a step further: if you look at what the network is, it is intelligent, fast, digital plumbing. Think of it like a broadband network in the sky. Like any network, you have consumers but you also have to have content providers. If you look at the internet, you have websites, which are content deliverers, you have subscribers that are users and the network connects them all together. If you look at a network-centric system of the military variety, a network provides the connectivity but the intelligence surveillance reconnaissance platforms

actually collect and gather the data that feeds the network. That is an area where Defence just do not appear to see the importance of making an appropriate level of investment. The only area where we have a reasonable investment is in the Wedgetail AEW&C. JORN has some capabilities but also a lot of limitations.

If we look at other areas of what we would call the network-centric constellation—that is, the area of passive electronic surveillance, ground surveillance with ground-moving target indicator, long-range high-footprint synthetic aperture radar and such—there is very little investment at this stage. I know there have been comments by Air Force in *Aviation Week & Space Technology* recently that they wished to pursue this, but we see no concrete force structure plans; we see none of this in the literature. The model that Defence are proposing cannot deliver what they believe it can deliver. I think that can be supported by hard numbers with no great difficulty. Now, there is another issue here.

Mr HATTON—If you have finished that, I have a second related question.

Dr Kopp—This is the second part of this answer, if I may.

Mr HATTON—Yes.

Dr Kopp—The other issue here is that we will not have an asymmetric advantage in networking in this region. The Russians have been selling equipment like TKS-2—it is called Tipovyi Kompleks Svyazi—which is basically a network for networking fighters. In fact, the Indians used it to embarrass the Americans in the Cope India exercise just over a year ago. Regional nations are buying airborne early warning and control aircraft. They are buying surveillance aircraft. It goes a step further: the Russians have been actively marketing long-range missiles that are designed to destroy airborne early warning and control aircraft and all of these surveillance platforms from perhaps 200 nautical miles away. This is a deep and fundamental issue, because they can hold at risk every surveillance platform that we put up. Unless you have a fighter plane that you can push out, possibly beyond the limits of coverage of your network-centric system, to hunt down these fighters and deny them the opportunity to shoot such long-range missiles, you are playing Russian roulette with the whole substance of your system.

Mr HATTON—To sum up that argument, you would say that you should have a tier 1 network-centric fighter against a tier 1 network-centric fighter and the fundamental problem with the JSF is that, although Defence is arguing increased situational awareness, because of the fact that it does not have the legs and is dependent upon the refuelling, it has to and the refuellers have to push far further into the battleground. Those missiles can knock out the refuellers. Then the situational awareness of the JSF pilots would be that they have no fuel and they may have nowhere to go.

Dr Kopp—Yes, indeed. I think that is another fundamental problem. This is an issue that some years ago was put to me by a number of colleagues, particularly in industry, who were saying: 'For God's sake, Carlo, what do they think they are doing? They are going to push these tanker aircraft out with a package. They are going to be in the position with a fighter like the JSF—which has limited performance and, importantly, sensor limitations, stealth limitations and very limited autonomy compared to an F22—where all of these assets become exposed. Or, on the other hand, they are going to have to treat these fighters as sacrificial lambs and accept the

fact that they will lose larger numbers of them because they will be operating them at the bounds of what the network-centric system can support.' The reality of any of these network-centric systems is that they are only as good as the sensor systems that support them.

Senator JOHNSTON—Thank you, Dr Kopp and Mr Goon for your contribution. Forgive me for being ignorant as to the great deal of technical information that abounds on this subject. When I try and reconcile your submissions with some other submissions we have and indeed the Defence department's and Air Force's position, it seems to me you are saying, 'Yes, we must go with NCW; that is the way of the future.' I take it I am right in putting that to you. Network-centric warfare is the way of the future.

Dr Kopp—There is no question about it. Network-centric warfare is a necessity. My concern with network-centric warfare is that it is misunderstood in Defence. It is being presented as being capable of doing more than it can, and I do not believe that their implementation will deliver what they believe it will deliver.

Mr Goon—Basically our view is network-centric warfare as accepted by the majority of the world is a requirement for Australia principally because we need to maintain parity with the region.

Senator JOHNSTON—I think we can tick off that network-centric warfare is the foundation stone upon which we look to build the capability. Am I too bold in saying that?

Dr Kopp—I believe that would be far too bold a statement.

Senator JOHNSTON—Okay.

Dr Kopp—The way one would look at NCW is that it is one of the necessary functional prerequisites, but it is not the most important prerequisite within itself.

Senator JOHNSTON—But we have to have it and we have to be part of it, particularly on an interoperable basis.

Dr Kopp—There is no question about that.

Senator JOHNSTON—I will put some matters to you that are in another submission, the submission by Dr Stephens. I will take a bit of time to get this debate going because I think we need to clarify this. He says:

> Presently, substantial numbers of Su-27/30s are entering the inventories of the Chinese and Indian air forces, and operationally insignificant numbers are being acquired by Indonesia and Vietnam. Should Australia ever find itself in direct military conflict with either of the nuclear-capable, emerging superpowers China and India ... without American support, then the capabilities of the respective combat aircraft are likely to be academic. And in any other hypothetical defence contingency, the 'platforms equals capabilities' mentality is some forty years out of date.

Do you take issue with any of that?

Dr Kopp—Yes, I do take issue with that statement. This is a disagreement that I have had with Alan in the past.

Senator JOHNSTON—I think we are getting to the kernel of what we need to define in terms of points.

Dr Kopp—There is a basic issue of how we define the region and how we plan our force structure. The idea that the near region—and this covers the South-East Asian nations—is virtually our sole concern because of geographical proximity is really predicated on the idea that this is the only land mass from which you can launch aircraft into Australian airspace. That assumption is no longer true.

If you look at the total capabilities that countries like China and India are acquiring, they will have the ability to reach into Australian airspace or our area of interest. But—and this is the important qualifier or caveat—the amount of capability they can push out to these distances will be limited. It will be limited by how many aerial fuelling tankers they have; it will be limited by how many strategic bombers they have. What that means is that we will never face 500 Sukhois. We will, in a contingency like that, perhaps be facing 100 or 150, depending on how many tankers they have and how far they are prepared to push this forward.

China is currently negotiating with Russia to purchase surplus Russian strategic bombers. The numbers we are talking about are in the order of 20 or perhaps 40 aircraft. That level of capability is something that we could decisively defeat. The issue boils down to discouraging nations like China or others from even contemplating a coercive political play. The argument that this is academic is one that is predicated on assumptions that cannot be supported.

Senator JOHNSTON—I am trying to learn. I want to put to you some of the issues that we need to establish before we get into the technical debate. He goes on to say:

> Furthermore, and most significantly, Airborne Early Warning & Control has since been added to the matrix, thus introducing an information network dimension which has fundamentally changed the nature of air combat. And in the next few years, a handful of advanced defence forces, including the ADF, will integrate data from even more networked control and/or information sources (satellites, unmanned aerial vehicles, ground radars, navy ships, army formations, etc) into the total system. The end result will be an unequalled degree of situational awareness, which historically has represented a combat advantage of the highest order.

Do you accept that?

Dr Kopp—I believe that is basically a very optimistic assessment of what the technology can achieve in the next 20, perhaps even 30, years. I would be happy to take the technical detail of why this is on notice, because we could spend two hours drilling into it.

Senator JOHNSTON—That is good. I appreciate that.

Dr Kopp—I would say that that is an assessment that is overly optimistic, for reasons of basic technology. There is another fundamental issue in here, which is the types of sensors involved.

Senator JOHNSTON—What I am interested in is the next paragraph. He says:

To reiterate, very few defence forces will be capable of mastering the necessary concepts, systems, and organisational and personnel issues associated with network-centric warfare. In Southeast Asia and the Southwest Pacific, for the foreseeable future, only Australia and Singapore can realistically aspire to construct NCW capabilities. Even if other states acquire all of the necessary hardware and software, the challenge of making everything work as a system will be beyond them, at the least until 2020.

Dr Kopp—I do not believe that that is a reasonable assertion, either. I will present a number of reasons for why this is. For one, I believe that the demographic in a lot of Asian nations is such that they will be able to source the necessary talent. Another consideration here is that the standard of education and training across the region has been improving. I am sure that given the various reports and statistics we see on this issue in terms of comparing our educational system and demographic versus Asia that that case is pretty much made.

The next point I would like to make here is that the technology fundamentally involves a lot of automation—that is its nature. The idea that somebody will not be able to grasp the nature of the operational concept and make all of this stuff work is not reasonable. Russian equipment has tended to be designed for operators with very low skill levels. China has a history of doing that with a lot of their equipment as well. That is quite different from a lot of American equipment and European equipment that we purchase, which is overfeatured to the extent that you need people with university degrees just to figure out how to put it together.

Mr HATTON—An historical example is the Battle of Tsushima Strait in 1905, which was won by the Japanese against the Russians.

Dr Kopp—Yes. It is dangerous to underestimate what we are seeing developing in Asia today. That is something that I find personally very deeply concerning; it has caused me many sleepless nights.

Mr EDWARDS—I have two questions I would like to ask. I will preface those questions by saying that I share concerns about our ability to get things wrong. We only have to look at the manner in which we underassessed the capability of the North Vietnamese Air Force, and that was not all that long ago.

Mr Goon, I would like to refer you to an ASPI strategy report from February 2004. I will quote to you a portion of that. They said:

Naturally, some capabilities and requirements will remain classified, and requirements are subject to ongoing refinement as analysis continues. However, Defence needs to publicly specify, in detail, the capabilities of the JSF that make it the preferred solution for Australia's new air combat capability.

To your mind, one, have the air force done that but you disagree with them or, two, have they simply not done that?

Mr Goon—The simple answer to that is that they have simply not done that in terms of both the JSF and what the requirement is prior to even looking at a solution. The results of the requirements analysis, against which you then look for solutions, have not been fully enunciated. We basically have a situation here where it is not an appreciation of the situation but a situating

of the appreciation. The simple answer to your question is that they have stipulated neither the requirements of the JSF nor the requirements against which they are seeking the JSF.

Mr EDWARDS—I asked that question simply because I do not have the technical knowledge and I am trying to keep an open mind at the same time as absorb a lot of this data. I now turn to a response to that article which was written by then Air Marshal Angus Houston, now CDF, in talking about the F22. He said this:

The F/A-22 will be the most outstanding fighter aircraft ever built. It may even represent the end of the line in manned fighters. Every fighter pilot in the Air Force would dearly love to fly it.

We are also aware of intelligence now coming out of the United States which suggests that the United States might be looking at an export version of the F22. From what I have read, I understand that Japan may be at the top of the list of suitors in looking to acquire that aircraft. Mr Goon, if Australia requested the F22s, do you believe the United States would supply them? If your answer to that question is yes, I would like you to clarify why you think that.

Mr Goon—My answer to that question is definitely. The US would definitely favourably consider an approach from Australia to acquire or obtain the capability of the F22.

Senator JOHNSTON—Can you give us the evidence for that?

Mr Goon—That goes to why we are here today. It actually goes back to the process I went through as a company in determining which proposal activities I would engage in. In 1999, the Air 6000 project was launched, which was the project for evaluating Australia's new air combat capability. I, along with my industry colleagues, looked at what areas we may be able to contribute to in that process. My background and my company's activities included flight test and test and evaluation, so we saw significant opportunities given the attitude that was being displayed at the time that test and evaluation need to be embodied or incorporated into a process of capability development early in the process, because it is a womb to tomb discipline and a means of providing feedback and focus on the capability development activity.

As a company director, I was required to do the necessary due diligence exercise to determine whether this was an appropriate activity in which the company would invest its time and resources, so I called upon my associates in the Department of Defence in Australia, as well as those in industry and overseas, and quite rapidly determined that there was a lot of interest in the F22. There was a lot of talk about the expense and so on, but that was the standard spiel at that point in time for any large development program. What people were really talking about was the program cost, not the actual cost of the aircraft itself.

There was enthusiasm in the Air Force in Australia and in the industry divisions of the then Defence Acquisition Organisation, which begat DMO. There was enthusiasm across the pond for Australia to seriously consider the F22. A number of my colleagues that I spoke to, many of whom are still in uniform, expressed that interest. I then observed activities going on in the States where they were looking at and developing export configurations for the F22. That went on through the period 1999-2000, and by pretty much the end of 1999 they had developed two configurations: configuration A and configuration B.

Senator FERGUSON—They still have not said that they will sell it, have they? They still have not said that it is available.

Mr Goon—We have not asked.

Senator FERGUSON—That is not the point.

Senator JOHNSTON—They have to go through the joint defence committee first.

Senator FERGUSON—Political reasons sometimes change and security reasons change. At no stage have the US committed to exporting the F22, have they?

Mr EDWARDS—They may not have—

Mr Goon—I would like to respond to Senator Ferguson. There is a particular process which one goes through to get access to the advanced technologies in the US—the 'crown jewels technologies', if you will, and the category in which the F22 technologies fall. That is covered in one of the papers that we provided as part of our proposal back in 2001. It is called the Molloy paper and was written by Lieutenant Colonel Molloy. It has become a bit of a Bible in outlining the process one has to go through to firstly get information on and then get access to this technology. Australia followed part of that process to the point where, through the Air 6000 process, two briefings had been developed in response to the request for information from Air 6000. One was on the performance of the F22 in toto. The briefing, as I was led to understand by associates in the States, was for the all-up round—in other words, the full kit and caboodle. The second briefing was as a result of an assessment that was made by the team that put the briefings together in the States. As a result of reading the inputs from Australia, they inferred that our understanding of the stealth technologies could do with some assistance. That is perfectly understandable given the classification, the secrecy and the broad nature around stealth technologies.

So the second briefing—again a classified briefing—was on stealth technologies. Those briefings were endorsed by the Chief of Staff of the US Air Force at the time, General Ryan, and the then Secretary of the Air Force to be given to Australia as part of the response to the Air 6000 request for information. There was a change of command at the time that endorsement occurred, and General John Jumper came in as chief, along with Dr James Roche, who came in as Secretary of the Air Force. So the Secretary of the Air Force International Affairs, who is responsible for the release of materials to foreign nations, requested them as the new incumbents to endorse the release of those two briefings. My understanding—again, from associates in the States, principally in Washington—was that they were endorsed enthusiastically.

CHAIR—Mr Edwards, did you have another question?

Mr EDWARDS—I have a number of questions, Chair. We have not yet got to the F111, we have not got to the gap issues, we have not yet discussed the issues of the Hornet. I have a number of questions, but I know other members have as well, so I will defer to them and hopefully we will be able to come back to these other issues, which I think are crucial to our terms of reference.

Senator FERGUSON—On page 35 of your submission, you refer to F111 life of type. Given the classified nature of fleet availability data, I am unsure how much credibility to afford your statements about life of type that are drawn from unclassified sources. Can you confirm whether your proposal had access to formal reports from Defence about the sole operator program, or are these assertions based on other sources of information; and, if so, what are those sources?

Mr Goon—The simple answer to that is both, Senator. Moreover, that also brings into focus one of the reasons why we maintain this whole issue is so bizarre.

Senator FERGUSON—What is bizarre?

Mr Goon—It keeps going to our credibility; it keeps being personalised down to the credibility of those who put forward a countervailing view. However, that countervailing view is left out there without any contribution from those whose views are being countervailed, except to attack us personally and attack our credibility.

Senator FERGUSON—I am not attacking you personally. You said your sources are both, so that means that are claiming you do have access to the formal reports. Do you?

Mr Goon—I have read reports from the sole operator program; that is correct—draft reports. In fact, there are draft reports on the sole operator program on the Web. I have had discussions with people up until the point they were told that if they were to talk to me or Dr Kopp they would suffer sanctions and possibly be asked to leave their organisation. Up until that point we were having—

Senator FERGUSON—Unless you can substantiate all those claims—

Mr Goon—I beg your pardon?

Senator FERGUSON—Unless you can substantiate those sorts of remarks, I do not think they should be made here.

Mr Goon—When you say 'substantiate', what you are asking? Do you want me to name people?

Senator FERGUSON—'I spoke to people' does not tell us anything.

Mr Goon—I am happy to discuss the names of those people in a closed session where those names do not become public domain. The conundrum for me is that many of my colleagues—whether in uniform, in the defence sciences area or in the industry area—though they agree with what we are saying, are not prepared to come forward and speak out, principally because they are concerned that if they do they will have done to them what has happened to me.

Senator FERGUSON—Also on page 35, you say, 'In 2001, an Australian industry team was formed.' Which companies comprised that industry team?

Mr Goon—This was the Defence Teaming Centre Air 6000 technology group. Again, I feel if I named those companies now I would be doing them a disservice. I am happy to name them in

camera but I am not prepared to at this point in time, Chair, because of my concerns about what may befall them. Based on my own experience and the experiences of other companies, I am not comfortable stating them in a public forum.

Senator FERGUSON—On page 35 of your submission you refer to the F111 upgrade, which is one of the things underpinning your proposal. Extensive upgrades planned for the FA18s are described in your proposal as high risk and likely to induce considerably downtime for the fleet. Why are upgrades to the F111s stated to be low risk? Won't the incremental nature of them lead to similarly extensive downtime?

Mr Goon—The upgrades proposed for the F111 are principally technology insertion upgrades to upgrade the remaining legacy systems in the aircraft. The nature of the upgrades and the types of technologies that we are talking about are low risk technologies. In fact, the work that was done during the avionics update program and the subsequent block upgrade program for the F111 has in fact established the mechanisms whereby those technology insertion programs can be undertaken with minimum risk.

Senator FERGUSON—How long did the avionics upgrade program take?

Mr Goon—The AUP—

Senator FERGUSON—From start, wasn't that something like seven or eight years?

Mr Goon—That was monstrous, yes. But we are not talking about anything near that size in terms of avionics. We are talking about the remaining legacy avionics in the aircraft, which are principally the cockpit, the radar and the Pave Tack system.

Senator FERGUSON—I know we are short of time, but there is one further question I want to ask. On page 37 and 38, you talk about analytical techniques. Your submission refers to an analytical technique that favours the Defence solution. Can you describe what that is and why it is biased?

Mr Goon—I might defer to Dr Kopp here, because we are talking about the operational economics analysis. Is that correct?

Senator FERGUSON—You talk about analytical techniques that favour the Defence solution—that is what you say in your submission.

Dr Kopp—When we perform these analyses, we basically use the best case figures that Defence presents for these platforms. In other words, we do not apply a number of standard measures that you would use to, for instance, scale down availability or make assumptions of excess combat fuel consumption. We also made very optimistic assumptions about the drag or performance impact of the types of weapons involved. I would certainly be happy to take that on notice and give you a detailed summary, item by item, of specifically where we accounted for what performance parameters and precisely how we favoured the Defence case.

Senator FERGUSON—While you are doing that, I wonder whether you could perhaps look at your own analytical techniques, because figure 9, which is on page 38, purports to compare

the cost of delivering follow-on stand off weapons. Presenting two F111s by themselves does not take into account any attributed infrastructure, such as the additional cost of maintaining two streams of logistics, and training aircrew and maintenance personnel for the two aircraft types which this solution requires the ADF to purchase and maintain. If you are going to talk about analytical techniques being biased, perhaps you could look at that and explain to the committee why you did not take into account those issues when you were looking at the comparisons of costs.

Mr Goon—If I may, you in fact are making an assumption that we did not take those into consideration. In fact, we did. That is in part—

Senator FERGUSON—That does not appear on your graph. All we see are the two fighter aircraft.

Mr Goon—Nor do the considerations in terms of the detail of logistic support for the FA18 and the tankers and JSF and the tankers appear on that. That is an operational economics analysis, which is looking at it from the point of view of firepower. Those matters have been taken into consideration. One of the reasons why those aspects have not been put there in detail for the F111/F22 force structure model is because they are proprietary. They are part and parcel of what we put forward as our proposal back in 2001.

There are significant economies to be made in relation to what we see as an optimal fore structure solution. Our proposal is not at the other end of the spectrum of what is being proposed by Defence; that would be a fore structure not dissimilar to what the Americans are pursuing, with the F22 as tier 1 of their high capability and JSF as their tier 2. The sleeping cobra within that fore structure, though, is tanking: both those aircraft will require significant tanking because they are both, compared to the F111, relatively short-range aircraft. What we sought, when we set about putting together an innovative cost-effective solution to defence's capability needs back in 1999-2000, when we first started this work, was an optimal solution—optimal from the point of view of capability, from the point of view of cost and, more importantly and significantly, from the point of view of risk, both in terms of program risk and in terms of the national interest.

Senator FERGUSON—Your solution also includes buying twelve 747 tankers in addition to the five hundred and three 3200 tankers that are already planned.

Mr Goon—No, that was a separate submission. That was a separate paper that was not included in the evolved F111 option.

Senator FERGUSON—So now you are not proposing that?

Mr Goon—No, what I am saying is that that is a separate proposal. Certainly, we still believe—we put it forward—that that is an optimal solution for the tanking requirements. The evolved F111 option went to the issue of the air combat capability. In terms of what happens in the US with their tanker fleet recapitalisation, we are fairly confident you will see many if not all of the aspects in that tanker paper that Dr Carlo Kopp wrote back in—1998, was it?

Dr Kopp—No, it was written late in 1999, published by the Air Force in 2000. It is a 140-page study of aerial refuelling. I was very pleased recently to see the RAND Corporation analysis of alternatives public summary come out, because many of their conclusions were basically the same as mine but after a completely different analytical method used five years later. So I am satisfied that that proposal stands on its merits, regardless of what we do with the fighters. The difference here is that, if you use F111s, rather than having to launch multiple small fighters and multiple tankers you can launch a much smaller number of F111s and a much smaller number of tankers to deliver the same effect.

To address what Senator Ferguson raised previously—and I think it is a good question in terms of where the issue of operational costs stands—we can quibble perhaps about one fighter being 30 per cent or 10 per cent more expensive than another, but, in terms of gross costs, if you have to launch a tanker with one particular type of aircraft to support it but you do not have to launch a tanker to use the other aircraft then clearly there is going to be a significant difference in costs, simply because of the cost of putting that tanker up.

This goes a step further if you consider the smaller payload and combat effect that you get from a smaller fighter. For example, if you have to get however many bombs or guided missiles on target—and let us assume you want to put four or eight missiles onto a particular target—and you have to launch four fighters and three tankers to do it rather than perhaps one or two fighters and one tanker, that is a huge difference in operational costs. And that is not something that is going to change if you alter the operating costs of these vehicles by a few per cent here or a few per cent there. In the end, if you have to put up twice as many aircraft to do the job, you are going to run up costs that are, if not twice as much, nearly twice as much.

CHAIR—I indicate that we have gone over the scheduled time for Dr Alan Stephens to appear as a witness. I apologise to Dr Stephens. We have a range of questions and the committee will look at whether we will need more time. That is an issue for the committee.

Mr WILKIE—Gentlemen, thank you for appearing today. It is good to finally catch up with you in person. Firstly, I would like to make a few comments. There is the question of whether the US will sell us the F22A. A question that could also be asked is: will the JSF actually perform as they say it will? As yet, we do not know if that is the case. I am mindful of what happened in Korea. We were throwing up World War II generation aircraft against Russian MiGs and wondering why they kept getting shot down. So I want to make sure that, if we are putting our people in harm's way, they have the best possible equipment. On page 43 of your submission you state that a F22A is twice as capable as a Joint Strike Fighter in most roles. You have outlined a bit of it, but could you comment on the roles that you are referring to? Then could you outline the roles, if any, in which the JSF is actually more capable than the F22A?

Dr Kopp—One of the unique attributes of the F22 is the fact that it has supersonic cruise. That means that it can sustain supersonic flight in its supercruise regime at roughly twice the speed at which most other fighter aircraft move around. Most conventional fighter aircraft will cruise or maintain station at speeds of about 0.8 mark. The speed of a supercruising fighter like the F22 is closer to 1.5 or 1.6 mark. I would say that in any role where time to cover distance matters, the F22 is automatically in the position where it can do twice as much work. I will give you one example. If you were using it for a reconnaissance role or an intelligence/surveillance reconnaissance role—and that is really supporting the network-centric capability that we talked

about previously—you could cover twice the footprint in the same amount of time and therefore gather twice the amount of information.

Mr WILKIE—Then what role would the JSF perform that might be better than the Raptor?

Dr Kopp—I have spent a lot of time soul-searching over that. Certainly in all the bombing roles, the F22 has the capacity or the potential with external carriage to deliver twice as many weapons. It is a much bigger aircraft. It can get into environments where the JSF would clearly not survive. I am not convinced that there is any specific role that the JSF would do significantly better than the F22. Even in close air support, which is the optimum role—let us say, the datum point or the core focus—where the JSF's design is being put; that is, close air support and battlefield interdiction—the F22, certainly on the basis of all the available data, will be more survivable and will generally have the capability of carrying more weapons.

Mr Goon—If I may say so, the question itself is a bit unfair on the JSF in that we will not be able to make a determination on the capability of the JSF until it is demonstrated, and that will be some time in the future.

Mr CAMERON THOMPSON—I refer to paragraph 4(c) of your submission, which is on page 105 in our area. You have listed an estimated price for 2,458 Joint Strike Fighters at $214 billion, which is just mind-boggling. Can you tell me the equivalent figure for the anticipated total of, as I understand it, 381 F22s? Is there an equivalent overall price? We are talking about unit prices, in the end.

Mr Goon—No, that is not unit price; that is program price.

Mr CAMERON THOMPSON—That is right. I am coming down that track.

Dr Kopp—I would have to probably look that one up.

Mr Goon—Unfortunately, I do not keep those figures in my head.

Mr CAMERON THOMPSON—Is it a bigger program? Is it a more costly program than the JSF?

Mr Goon—No, the JSF is the largest military development program ever. While we are talking about that, I would like to put on record that we are not—I repeat: not—anti the JSF. In fact, we are strong proponents of the JSF program in the sense that it is an opportunity for further advancement and development of aerospace and military technologies. Us being portrayed as being anti the JSF is just plain wrong.

Mr CAMERON THOMPSON—I am not doing that.

Mr Goon—I am not saying you are.

Mr CAMERON THOMPSON—I am trying to compare apples with apples. If the price is $214 billion for 2,458 aircraft, I want to know what the overall cost is for the program with 381 aircraft, because that is going to figure at the end of the day if we want to buy some of those 381.

Mr Goon—What is the total program budget for the F22?

Dr Kopp—I would have to look that up.

Mr Goon—We will have to look that up. I have the figures; I do not have them on me. That information is contained within the Selective Acquisition Report to Congress. It is certainly nowhere near $214 billion.

Mr CAMERON THOMPSON—I will not hold us up for too much longer. Can you tell me what the range of an F22 is?

Mr Goon—The range of an F22 is still not publicly releasable.

Mr CAMERON THOMPSON—Do you know what it is?

Mr Goon—We have done our own analysis of it, and it is of the order of or slightly better than the JSF. It depends on where you are in terms of your operational envelope and what you are doing.

Mr CAMERON THOMPSON—This is moving off the cost issue to the performance issue. In your model, you are anticipating that the F22 would be able to protect the F111s. How much of the total range of the F111 would they have F22 accompaniment for? Do you see what I mean? If the F22 is going to be providing—

Mr Goon—With or without tankers?

Mr CAMERON THOMPSON—The virtue you are selling of the extended F111 is that it has this massive range and would be able to go out there. How could F22s protect F111s over a longer range than JSFs supported by tankers when you say the F22 has about the same range or a slightly longer range than a Joint Strike Fighter?

Dr Kopp—You would be using tankers to support those F22s but, given the capability ratio of the F22 compared to a JSF, you would require less tankers.

Mr CAMERON THOMPSON—Hang on—why would you require less tankers if you say the range is—

Mr Goon—Firstly, the F111 does not need tankers, whereas the JSFs need tankers.

Mr CAMERON THOMPSON—Thank you.

CHAIR—We will have to cut it off at that point, because we are going to get way behind. We have other witnesses. The subcommittee will obviously make a decision as to whether we are going to need more hearings. I thank you both for your attendance here today. If you have been asked to provide additional material, would you please forward that to the secretary. You will also be sent a copy of the transcript of your evidence, to which you can make corrections of grammar and fact. I thank you for your appearance before the subcommittee today and for your submission to the subcommittee.

[10.39 am]

STEPHENS, Dr Alan, Private capacity

CHAIR—Welcome. Do you have any comments to make on the capacity in which you appear?

Dr Stephens—I am a visiting fellow at the Strategic and Defence Study Centre.

CHAIR—Although the subcommittee does not require you to give evidence on oath, I should advise you that these hearings are legal proceedings of the parliament and therefore have the same standing as proceedings of the respective houses. Would you like to make an opening statement?

Dr Stephens—Yes. Good morning, everyone. I want to comment on the evolving nature of the Western way of war—that is, the Australian way of war—which has been perfectly clear for the past 60 years. Increasingly, the Western way of war has been characterised by the exploitation of our highly educated work force, our technological superiority and our strong economy, which in combination enable us to fight with overwhelming knowledge superiority and precision at a distance. Many Third World countries fight very well close up. The point for us is to deny them that opportunity.

This Western model of war fighting remains valid regardless of whether we are operating in an air-sea gap, a Middle Eastern desert, an Asian jungle or an opaque urban environment. As my submission to the inquiry describes, control of the air is the necessary start point for this Western way of war. As far as the ADF and regional air superiority up to 2020 is concerned, the simple answer is that, within the settings of theatre level conventional conflict and the point defence of vital assets and when opposed to traditional air threats, the ADF will certainly maintain its existing level of superiority, if not extend it.

There is a frustrating tendency by some commentators to equate the mere possession of fighter aircraft with capability. Last week, for example, an editorial in the *Canberra Times* associated the arrival in our region of a handful of SU-27s with a significant control of the air competency. Commentary of that kind from that level is disappointing and ill-informed.

I will elaborate with a simple but telling example. For most of the last 20 or so years the primary control of the air platform for the British Royal Air Force has been the Tornado F3 fighter. When the Tornado emerged in the mid-1980s—some time like that—the F3 fighter variant was very quickly recognised as an inferior platform in terms of power to rate ratio, manoeuvrability et cetera. It was widely regarded as a lead sled. In mock NATO combats against highly manoeuvrable aircraft like the F16 and F15 it was constantly outperformed.

In the early 1990s the Brits added a simple data link to the Tornado F3, a broadband communications and information system that hugely enabled this mediocre platform's information competence. Overnight the Tornado F3 turned into an F16 and F15 killer. It had not

improved its firepower or its manoeuvrability; it had improved vastly the pilot's situational awareness.

I would also like to point out the fact that the Spanish air force, a highly competent and well-regarded air force, is currently re-equipping with the Eurofighter, which is vastly superior to the generation of fighters it is replacing, particularly in terms of information and knowledge systems. Spanish air force fighter pilots are currently going through the process of totally revisiting their air to air combat procedures because their knowledge dominance has increased so hugely because of the information systems the Eurofighter brings to them. They are rewriting their air combat doctrine from the ground up.

Suffice to say that in the 21st century environment of beyond visual range combat in network systems, the ADF is constructing a networked air defence system that for its size will be the equal of anything in the world and will be far superior to any system in our region with the exception, as was noted previously, of those of the emerging superpowers, India and China, and perhaps of Singapore. No other regional state can realistically aspire to assemble the essential combination—and it is a combination; it is not one plus one but the whole shooting match—of high-quality people, advanced technologies, robust indigenous R&D, the right ideas and the economic strength.

Mr Hatton referred to Tsushima. I would regard Tsushima as an endorsement of the move towards modernising network forces rather than any stereotype of national competencies. What happened at Tsushima was that the modernising Japanese defence force utterly routed the intellectually moribund Russian defence force.

The one caveat I want to make to the control of the air setting that I am describing relates to asymmetric challenges to the west's long-standing dominance of air warfare. Here I am referring to such weapons systems as short-range shoulder launched missiles used against civil airliners and medium- and long-range missiles used against population centres, major infrastructure and the like. In particular, given the reported proliferation of man-portable anti-aircraft missiles since the collapse of the Soviet Union, I am surprised that more attacks have not been made against airliners. It strikes me that it is far easier to buy a MANPAD on the international arms black market than it is to enrol in flight school to learn how to fly a 757. If we managed these kinds of asymmetric threats, it may be the case that in the future land forces will have to assume a greater part in our control of the air system. That concludes my opening comments.

CHAIR—I open the inquiry to questions from the committee.

Mr EDWARDS—I listened with interest to what you had to say in relation to our capacity to master network-centric warfare in a far more superior way than any other nation in our region. I think that history has shown that we have made other assumptions about the capacity of other people in our region which have turned out to be wrong. Would it not be better for us to develop our network-centric warfare capacity in the belief that other people in our region can indeed meet our capacity to do so rather than assume a superiority which at the end of the day may not be there? I ask that quite genuinely.

Dr Stephens—It is an important question. I am not trying to imply that other nations will not be capable of achieving some degree of networked competency. My deduction does not come

from national stereotypes. It is more organisational. If network systems are to realise their full potential, very significant developments in how defence forces work together will be required. The joint warfare model is what I am talking about. Joint warfare is dreadfully difficult to achieve traditionally. There are few more powerful cultures than the individual single services. Ours do very well, relatively, but in my opinion they could do a great deal better. However, my observation from travelling around the region and lecturing in places is that we do it a far sight better than anyone else in the region. Unless the joint strengthening is there, network-centric warfare will not be fully realised. What I am saying is that we are long way further down the track towards making the joint model work effectively. I believe there are very significant organisational barriers in almost all of our regional neighbours to progress much further than they are at the moment. If they do not, they will not network to the full extent. Does that address your concern?

Mr EDWARDS—Yes. I have one more question. What distinguishes the JSF to such a degree that you believe that no other manned aircraft in the region will be comparable in network-centric warfare for the next 30 years?

Dr Stephens—Again, that is a central issue. What has not been stressed sufficiently this morning, in my opinion, is the fact that the JSF has been designed from the ground up for network-centric operations. It is going to benefit considerably from developmental work done on the F22—it already has. Previously, the question was asked: in what domain is the JSF superior to the F22? It was not sufficiently emphasised, in my opinion, that it will be considerably superior in the ISR—information surveillance recognisance—domain. For example, it will have a much superior optical electrical ISR system to the F22. It will have a transmit-receive data link. At the moment, the F22 has only a receive data link, which will inhibit its ability to network fully with ground forces. I would also maintain that within the dispersed nonlinear modern battlefield, in which the exchange of information is just as important as the application of firepower and manoeuvre, that ISR capability assumes an importance of the highest order.

Mr WILKIE—Dr Stephens, you say on page 4 of your submission:

> There is a consensus amongst air defence professionals … that the key to victory in the twenty-first century will be to dominate the beyond-visual range domain.

You have commented a little on this, but could you comment further on the ability of the JSF to dominate that BVR domain in our region, given the region's purchase of those Sukhoi fighters.

Dr Stephens—Certainly. In the 21st century air combat domain, the component of firepower and manoeuvre that makes up your basic combat module will be performed not by the aircraft but by the missile. I noted that in Group Captain Green's submission to your inquiry he referred to the Vietnam experience. With due respect to Group Captain Green, that is seriously out of date. In Vietnam, you shot down other aeroplanes by getting on their tail, because your missiles had a very narrow arc in which they could attack; because they were infra-red, they had to get behind a jet pipe. Today, you can shoot down aircraft that are behind you. You look at them, the sight cues, your missile does all the hard work. I may be stretching the point here, but it is to make the point. Your platform could be a Boeing 747 if you were sufficiently bold; it is the missile that does the moving.

So, within that environment, the fact that the JSF will not be as manoeuvrable as an Su-27—that is certainly the case—becomes largely irrelevant. The key is to make the detection before the other fellow. That has always been the key: it is simply how to get behind him and then shoot him down. Now you shoot him down pretty well within perhaps a 135° arc from the nose. So the priority in manoeuvre and firepower has shifted from the platform, whose main job is detection, to the missile, whose job is to manoeuvre and apply firepower.

Mr WILKIE—Thanks, Dr Stephens.

Senator FERGUSON—Dr Stephens, I loved your submission: I can read it! And understand most of what is in it—but not everything. The basic question, with your obvious knowledge of the area and all the information that you have given to us, is: on a personal note, in relation to our future air superiority do you think the JSF is a good choice?

Dr Stephens—That is one of the central questions as well—and yes, I do.

Senator FERGUSON—That is what we have to decide in the near future.

Dr Stephens—Yes, I do. There is no question that the F22A will be the outstanding air superiority fighter. Everyone accepts that. I say as someone who loves aeroplanes but who nevertheless is a taxpayer that I would be highly put out if we were to pay $200 million for a platform. We just do not need to do that. We can find another answer. It is unacceptable to me as a taxpayer to pay that kind of money.

Within the context that I have briefly outlined, I think the JSF will be an excellent system. It will give us excellent control of the air capability. As part of a system, it will be an outstanding network platform. I think the Army have yet to fully grasp what this thing will do for them. I think they will love it when they start doing urban warfare operation or jungle operations with a platform, a system, that for the first time will bring them instant attack information that they have never had before.

I notice in General Leahy's recent paper on the Army in the air he noted that their schedule includes bringing AEW&C into the whole matrix by 2014. I would like to see him extend that to explicitly recognise the JSF as well, noting that he mentions it and supports the acquisition in his paper. But the JSF's ISR potential is enormous. It will represent a quantum leap that in my opinion more than offsets its lesser performance as an air superiority dogfighter. The total package, I think, is the best option that the ADF can pursue.

Mr WILKIE—I have a question in relation to that issue about the Army's use of the JSF. Wouldn't the Army be better served using unmanned aerial surveillance aircraft that can stay over the target for a lot longer?

Dr Stephens—UAVs, I have no doubt, will be the next tranche. I imagine the JSF will be the last manned fixed wing combat aircraft that the ADF will operate. Right now, my understanding is that you will not get the flexibility, the speed and the load carrying capacity. The JSF, for example—and this was not mentioned—in a stealthy configuration can carry two 2,000 pound bombs. Sure, in the future I have no doubt that UAVs and UCAVs will become the preferred

system. I would think that in the period we are talking about the JSF is a much better technology option.

Mr HATTON—Dr Stephens, thanks for the note about the modernisation of Japan. Do we still need a long range strike capacity, which has been entirely at the centre of our approach to air superiority? Because of where we are situated in the region, it does not seem that long range approach is there with the JSF and the network-centric stuff. Do we need it?

Dr Stephens—First, yes, I believe we need it. I do not support keeping the F111 in service—I am not a big fan of engineering solutions to drag old aeroplanes along past their natural life. If I can digress briefly, I have an Air Force background. I resigned from the Air Force in 1982. My last flying job was as commanding officer of the F111's predecessor, the Canberra. It was an old aeroplane, and it was an engineering nightmare keeping that thing in the air. I love the Canberra—

Mr HATTON—Will the Americans have that engineering nightmare because they have determined that they will keep the B2 bomber until 2040?

Dr Stephens—It is difficult to compare us, because of the scale and the amount of money. They have already done things to their B52s, for example, that I would think that we would not have completed because of the engineering effort and expense involved. The AUP—the one that was touched on—was a very big undertaking for a relatively small organisation like ours. We did wonderfully to achieve it, as we have done with the F111 through its whole life. But it has not been easy.

Getting back to your original question, yes, we should—if at all possible—retain a strategic strike capability. Manned aircraft are probably still the best option for that, noting nevertheless that you can get it from special forces and perhaps from submarines. Against that background, I do not believe that the F111 is a viable option past its planned retirement date. I do not have access to classified information. My information from friends in America from open sources is that with the system we are putting together the JSF will be a credible deterrent force.

Mr HATTON—When we finally get there. If we put that aside, in the interim the F111 gets pulled out. We have no long range strike capability. The decision has been made to upgrade the Hornet. You are concerned about cost; we are concerned about cost. In terms of what has been projected for the Hornet, redoing the central barrel of the Hornet is going to cost a significant amount; the range of other upgrades proposed for the Hornet are going to cost significant amounts. Is that the best way to go? Defence has not got to that point yet. Would a substitute be a better commercial proposition? In terms of the gap, our strike capacity goes if they pull the F111 in 2010. The margin in terms of the JSF has now gone from 2012 to 2013, possibly running further out—we still do not know what it will do. The uncertainty there is significant. How will the FA18, with the enormous upgrade cost and the problem that we do not have all that many in service, cover that gap?

Dr Stephens—That is probably the biggest uncertainty over the whole program—I agree. I would like to make a couple of points. Unlike the F111, which has no legitimate control of the air role—a very marginal role—the F18 will at least provide us with control of the air, strike and a whole range of options. The addition of the JASSM—which is stealthy and with a range of, I

believe, about 400 kilometres—is not to be lightly dismissed. It would capture the attention of the people whose attention we want to capture. Regarding your point about rebarrelling, I do not have access to Defence information, but it is clearly a big and expensive job. Would an interim Super Hornet buy be better—if that is what you implying—

Mr HATTON—Or the ERFs, which are available.

Dr Stephens—It would depend on the aircraft type. If it were the Super Hornet, my understanding is that the engineering and operational conversion implications would not be too hard. By the way, members might recall that when the F111 was delayed for the last time in the early seventies, the RFF leased 24 Phantoms. I thought they did an extraordinarily impressive job in converting to this very new aircraft type and bringing it online operationally within a matter of months. But those issues arise with having an interim aircraft rather than with stretching out the Hornet through a—

Mr HATTON—Another interim aircraft could be an F22, if they would give it to us, or it could be part of the capability of two Lockheed Martins instead of just the one in the JSF—buying 30, or however many, F22s and then integrating those with another 70 or so JSFs. We all know about the deseal or reseal problem with the F111. Apart from the barrel, one of the fundamental problems with the F18 is that the fuel bladders have perished. That was a significant problem in the F111s; it was going to be another really significant problem in the F18s. It would be better to run a substitute and say, 'They've reached the end of life. All this cost will allow us only three extra years, running out to 2015, to do it.' I just cannot see the sense in that.

Dr Stephens—That is a fair point. I do not have access to the cost benefit, engineering and operational implication papers, but your point sounds valid to me.

Mr CAMERON THOMPSON—I return to the question of network-centric warfare. You said that one of the differences between the F22 and the JSF was the transmit-receive ISR that would be on the JSF but not on the F22. I presume that somewhere down the track you would anticipate an installation of transmit-receive ISR onto the F22. What kind of step would that represent? Would it represent a very costly step to include that?

Dr Stephens—Again, that is an interesting point. The F22 was conceived solely as an air superiority platform. The United States Air Force commissioned the Rand Corporation to study the use of the F22 in the future battle space. Rand found out that the F22 would establish air supremacy in any conceivable setting very quickly—within several days. The question then became: 'We're going to pay $200 million for each of these things and then, after day three, they'll sit on the ground and do nothing.' In an atmosphere in which the United States Air Force was desperate to get F22s, that was clearly a very serious problem for them. They then came up with the idea of calling it the FA22 and adding some ground attack capabilities.

You may be aware that in recent months that nomenclature has been quietly dispensed with. It is now the F22A and the number the Air Force will get has slipped from the high 700s to about 130, I think. The USAF is still desperate to get as many F22s as it can. The hierarchy of the American Air Force would collectively sell their grandmothers to get more F22s. It defines their service. Nevertheless, they are under immense congressional pressure to justify both its

operational relevance in an environment in which they already appear to have overwhelming air superiority and its enormous cost. One obvious response is to continue with this attempt to give it some kind of residual ground-attack ISR capability.

What appear to be relatively small things, like fully capable data links, self-designating for laser-guided bombs, have been dropped to simply pare dollars off to keep the cost of the program under control. I have no doubt that, once the program is fully running and the machines enter service, there will be a move to enhance their ground attack capabilities. They will need to do that simply to justify having them, as we did quite successfully with the Mirage years ago, when we made it capable of dropping more weapons than it was originally designed to do. Yes, no doubt they will do that.

Mr CAMERON THOMPSON—I am indebted to a gentleman from the media there. I was chasing prices before, and he gave me an estimate—I do not know how accurate this is—that the cost of the F22 program was so far $US68 billion for 183 aircraft. If you were to put a transmit-receive ISR on top of that, what sort of a jump in price would that be? Do you have any idea?

Dr Stephens—Very small.

Mr CAMERON THOMPSON—Very small?

Dr Stephens—I cannot give you a precise number. In that setting, it is small change, but I think it is indicative of the pressure the US Air Force have been under to keep the F22 program from even greater congressional cuts that they have needed to look for savings wherever they could find them.

Senator JOHNSTON—Thank you, Dr Stephens, for your submission. I want to go to page 5, where you make some very important statements about the F35. You say:

It will possess an exceptional suite of active and passive fully-integrated sensors and data fusion avionics, and as the region's only VLO platform it will enjoy a unique degree of BVR superiority.

Leaving BVR to one side—let us take that as a given—why do you use the word 'exceptional' and why do you use the word 'unique'? I think that is what the committee really want to know because of the level of expenditure here; this is our biggest ever purchase. Why do you think this aircraft has those qualities, 'exceptional' and 'unique'?

Dr Stephens—It is unique because it is the only fifth-generation fighter that has been designed from the ground up as an ISR platform. It has benefited greatly, as I mentioned, from the F22 development program; and sensors that have been improved as the F22 program has worked its way through, added to the F35, have benefited from that program. It has an exceptional EO system. Its ability to collect and transfer information makes it, firstly, exceptional in relation to other fighter aircraft and, secondly, unique. No other aircraft has the ability to gather, process and share information that the JSF will have. That is the basis of my comment there. My belief, and it is a pretty common one, is that, in the modern battle space, ISR is as important as firepower and manoeuvre.

Senator JOHNSTON—Just to follow up: I am getting the idea from other submissions that the movement to beyond-visual range is not a given. Can you argue that for me? I think you are arguing that that is a given and that, historically, we have moved into that domain.

Dr Stephens—In the 1991 Gulf War, two-thirds of Iraqi fighters shot down were shot down by the then long-range AIM7, with about a 50-mile range, and one-third were shot down with the shorter range Sidewinder missile. So there was a clear trend there that detections were being made at greater distances.

Since then, AEW&C and networking generally have improved. We now have the AMRAM. I believe it has a range of about 120 ks. The whole capacity for BVR has increased as the technology has improved, noting that 1991 was probably when there was the first good use of some kind of networking. We have moved a great distance since then. We can reasonably expect it to work far more effectively in the future, noting, as I said, though, that, unless you have a very high degree of organisational coherence, this is not easy to do. I think the ADF still struggles in some areas because there tend to be single service stovepipes, but comparatively we are pretty good at it.

Senator JOHNSTON—In talking about the network capability, you mentioned Army. Do you include our submarines in that?

Dr Stephens—Certainly. As you know, the full version of the network includes everyone, from the digger on the ground with a modern radio pack who communicates directly—

Senator JOHNSTON—And special forces.

Dr Stephens—The whole lot.

Senator JOHNSTON—The full spectrum.

Dr Stephens—Yes.

ACTING CHAIR (Mr Hatton)—Thank you for your attendance here today. If you have been asked to provide additional material, please forward it to the secretary.

[11.11 am]

BABBAGE, Professor Ross, Private capacity

CONNERY, Mr David, Private capacity

ACTING CHAIR—Welcome. Do you have any comments to make on the capacity in which you appear?

Prof. Babbage—I am the Chairman of the Kokoda Foundation but I am appearing here in a private capacity.

Mr Connery—I am a researcher with the Kokoda Foundation. I am also appearing in a private capacity.

ACTING CHAIR—Although the subcommittee does not require you to give evidence on oath, I should advise you that these hearings are legal proceedings of the parliament and therefore have the same standing as proceedings of the respective houses. I do not think we have locked anyone up yet, but it may be possible. Do you wish to make an opening statement to the committee?

Prof. Babbage—Yes, I would like to make a few brief comments and then I will ask David to say a few things as well. Let me firstly thank you for the opportunity to appear before this committee and congratulate the committee for choosing to investigate this issue. My view is that Australia's air combat capability looking into the future is really a critical defence capability—in my view, perhaps the most critical one—to get right. I want to point out that, although David Connery and I are both from the Kokoda Foundation, what we are saying today is our own view. The Kokoda Foundation itself does not have views on anything to do with this.

Senator FERGUSON—Could you tell us in a few words what the Kokoda Foundation is?

Prof. Babbage—The Kokoda Foundation is a not-for-profit research corporation that has been in existence for about 18 months. It was established with two primary purposes. The first was to research the really tough future security challenges that we face. The second was to encourage a new generation of advanced strategic thinkers. We are very short on those. We are funded by both government and the corporate sector.

I would like to make four opening points. I think they build rather well on what Dr Stephens was just saying. It seems to me that the air defence environment, looking ahead at the next 25 or 30 years or so, will become much more demanding and certainly far more complex. With the characteristics of the change we are looking at, few current systems, even in upgraded forms, will be adequate to sustain air superiority into that time frame.

My second point is that the future regional defence environment will be highly networked. Air superiority will not be achieved simply by operating advanced fighter aircraft. Key elements will include space based sensors, high altitude surveillance sensors of various sorts, over the horizon

radar systems, airborne early warning and control systems, other electronic sensor systems and so on. In addition there will be critical key enabling capabilities such as aerial tanker aircraft. Advanced fighter bomber aircraft will clearly still be needed, but they are part of a total team. It is this networked environment that will be critical for success. Just one type of platform—say, a fighter or a fighter bomber aircraft—will simply not be adequate on its own. In fact, I would argue that anyone attempting to operate simply aircraft without a proper network in support will be highly vulnerable.

The third main point I want to make is that our strategy—that is, Australia's strategy and to some extent the United States' strategy, an alliance strategy—for fighting future intense conflicts and campaigns is likely to have a rather different shape from that of the more distant past. Rather than aiming to destroy extensive parts of an enemy's infrastructure through heavy air attacks and dropping large tonnages of bombs, we are far more likely to conduct very precise attacks using relatively modest firepower aimed directly at undermining the willpower of the opposing decision makers, aiming directly at changing the attitudes and approaches of the decision-making elite on the other side. This we often call 'effects-based' strategy, and I am pleased to say that just yesterday we published a volume on the topic, the first volume in Australia on effects-based strategy, and I am happy to leave a copy for you. It is very important because it will have a big impact on the way Australia conducts operational campaigns into the future.

My fourth and last point is that the new generation of fighter bomber aircraft epitomised by the F35 JSF is markedly different from the FA18 Hornet, the F111 and, for that matter, any other early generation of aircraft. A lot of these points have been covered before but let me highlight a few key aspects of this. The F35 is equipped with an extraordinarily wide range of very advanced sensors. What is more, most of the sensors are reprogrammable by software. This is a substantial advance. In fact I do not think that many people fully understand yet the sensor performance of this aircraft. This aircraft is likely to be used for roles that we have not in the past contemplated using combat aircraft for—certainly not fighter bomber aircraft. That will give us an enormous advantage, it seems to me, especially when tailoring these aircraft for future operations which may be rather different from those of our American allies from time to time.

Given this new combat environment and the new campaign strategy options and markedly new aircraft and other system options now before us, we conducted a study last year into the optimal mix of air combat systems for Australia, and I think that you all have copies of that. Briefly, to explain how we undertook that study and what the broad conclusions were, let me just hand over to David Connery to make a few comments.

Mr Connery—Thank you for the opportunity to explain our research to date. The aim of our report was to identify the strategic utility and the risks associated with differently sized JSF fleets. We wanted to examine what 3, 4 and 5 squadrons could deliver in terms of strategic effect and the risks associated with either purchase. In order to do that we held the number of supporting systems of airborne early warning and control and the medium-range tanker transport to be static. We also had to make some key assumptions when we started. Firstly, this force was required to be able to provide support simultaneously to one major operation and support to a minor operation and also have forces available to conduct a strike as well, and we took that essentially from Defence 2000.

The second major assumption that we made was that the JSF would be selected for phases 2 Alpha and 2 Bravo of Air 6000, acknowledging that for phase 2 Charlie, which would not be coming online until about 2018 or 2020, there could be a mix of uninhabited aerial combat vehicles, the Joint Strike Fighter, missiles or the like so we left that pretty well open. But when we came to our final analysis we kept JSF very much in the picture.

The way we developed our research was to conduct three closed workshops where we gathered experts across a range of departments, all three services, a number of think tanks, academia, and also industry. We set them a number of questions that helped us to formulate our answers. Part of that was to discuss three major factors. We wanted to look at strategic policy. We also wanted to look at threats and operational concepts and the logistics of air power. We then put two different scenarios to the panel. One scenario was a very standard defence of Australia scenario. The next was an expeditionary scenario where we were required to send small forces overseas in support of the United Nations or other coalition operations.

The key findings that we made were, firstly, that three squadrons severely limited the government's options in any scenario. With four squadrons the government had greater flexibility, though we found this was still marginally viable. Whereas with five squadrons the government had a much broader range of options both strategically and in terms of sustainment. However, we acknowledged that in order to get five squadrons the government was going to have to devote considerably more resources to getting the number of aircraft required for five squadrons.

We also wanted to make three key points out of it. Firstly, JSF is an information gathering platform, and to pick up on one of the differences between that and the Uninhabited Aerial Combat Vehicle which might do as an information gatherer, the JSF has got a person in the cockpit with weapons. They can identify, interpret and respond, which is a bit harder with most UACVs. Secondly, the importance of the airborne early warning and control and the medium-range tanker transport was clear. Indeed, the size of the fleets that we are intending to purchase for both these two types of aircraft could be the limiting factor on JSF operations. Thirdly, we not only need to consider the range of options that we might want up our sleeves, we also want to consider the strategic weight that Australia wants to have. What kind of role does Australia want in future in maintaining both its own security and international security? That includes a brief snapshot of the report.

Mr EDWARDS—Thank you very much for your encouragement for this committee having established this inquiry. As Senator Ferguson indicated earlier, one of the crucial issues that we need to deal with is the choice of the JSF. But there are other crucial issues including the issue of the gap, the extension of the F111, and the capacity of the F18s. Are there comments you would like to make in relation to those matters?

Prof. Babbage—The F111 is a rather old air frame. It is suffering, I believe, from quite a serious fatigue challenges and there are serious risks in taking it beyond a certain period of time without spending an extraordinary amount of money on it. In fact I believe that we are already spending a lot of money to maintain that air frame in service and there are compromises entailed in doing that. Let us not forget, it is not a stealthy aeroplane. It is an aeroplane which is not going to be a viable option in intense environments downstream. If you are thinking out more than a maximum of, say, another eight or 10 years, there are problems. Even now there are

environments where the F111 would be in some difficulty without an enormous amount of support. You would have to put a lot of jamming and other such ability in the area for it to be probably survivable in some environments today.

On top of that, the other key point is that it is not really fitted for highly networked operations. It is not a data gatherer like a JSF. Also it cannot download from off-board sensors. As a consequence it cannot, except in very crude terms, have situational awareness in an up-to-date form that something like a JSF can. It is a completely different sort of aeroplane and really reflects its origins. Is it technically feasible to extend at extraordinary expense? Does it makes sense cost effectively? I do not think so. I have been involved in looking at the costs of running that fleet from as long ago as 1986, from memory, and I do not think that it makes a lot of sense to try to spend a lot more money on the platform. I think that it is much better, frankly, that we turn our resources to the areas that are going to have a much higher pay-off.

On the gap issue, it seems to me that it is an issue we have to weigh up. I would council decision makers to be careful about balancing risk. If it looked as though the security environment in the region was going to get much worse, maybe we ought to look at the sort of options that we are not at the moment seriously contemplating, such as either advancing the JSF to an earlier date—and I do not know if that is going to be feasible—or looking at an interim solution. I am inclined to say that that is not likely to be necessary, but it seems to me that, if suddenly we were taken by surprise in 2008, say, and the F111s were about to go and it looked like we were going to have a gap, it would probably be possible for us to do a short-term leasing arrangement—with some considerable difficulty—as a back up. I have to say that I do not think we ought to plan seriously for that now. I do not think it would be money well spent.

Mr EDWARDS—In dealing with the interim, do you have a view about our capacity for and the cost of doing up the FA18 versus the option of a short-term lease? What would you prefer to see the government considering?

Prof. Babbage—I personally would be happier to pursue the rebarreling program and the other upgrade programs for the FA18 for a range of reasons—if we needed to do it. There is a real logic behind that. You have to also understand that there is a question of what the real costs are. The costs of running the F111 longer are very much more substantial and provide a lesser return, in my view, than a rebarreling option. The last figures I remember seeing in the capability plan for the rebarreling option was something like $500 million to $600 million—and that was for most of the fleet. Frankly, that is probably manageable if you want to go down that route.

The advantage of that is that not only do you get a fighter-bomber aircraft that can sustain itself reasonably well through the whole crossover phase of JSF introduction—through to about 2018 if required—but you also have the opportunity of if you wish expanding, by strapping other weapons on it, its strike capacity and its use in that role. It seems to me that that is a better payoff. It is something you can make use of anyway, whereas if you are going to spend a similar amount of money—in fact, you would have to spend more—on the F111s, you are not likely to be able to get the same return in my view.

Mr Connery—You are very right to focus on this gap issue. Strike, as Alan Stephens mentioned earlier, is very important for deterrence, but it is also important for termination. Having the ability to reach out and touch somebody where they live can be really important in

terminating a conflict. We need to think not just about preventing conflict, which is probably preferable, but also about how we are going to finish one if started. Maintaining that strike capability during that gap period is absolutely essential in my opinion.

Mr EDWARDS—Has the Kokoda Foundation done any detailed analysis of the costs of the JSF versus the F22—or any other alternative, for that matter?

Mr Connery—Sorry, Mr Edwards: we have not. Essentially, what we have done is taken the assumption that the F35 would be the aircraft and we have worked on that, so we cannot help you on that one.

Mr EDWARDS—So you accepted that assumption and worked on that?

Mr Connery—We took that as the assumption and worked from that.

Senator FERGUSON—Professor Babbage, you were probably here when I asked Professor Stephens whether he thought that the JSF was a good choice for our future air superiority. As you have just said, you have based all of your submission on the assumption that we will be proceeding with the JSF. Questions have been raised as to whether the choice of the JSF over the F22 is right, and we have to take that into consideration. Have you put your mind at all to the questions of (a) whether the JSF is the most economically viable buy for us, (b) whether it will do the job satisfactorily and (c) whether it is the best option for our future requirements in air superiority? Has the Kokoda Foundation given its attention to that?

Prof. Babbage—We did not include that in our study, but let me make some comments about it, which I am very happy to do. I certainly believe that the JSF is the best option. I agree with everything that Alan Stephens said about this. In fact, I would add a few points. I will make some comparisons with and comments about the F22, because some other things were probably said before we came into the hall about that.

I think it is the best choice for a range of reasons. As Alan said, it is designed from the ground up to be a networked aircraft. For exchanging information, it would be substantial data gatherer and, because the senses are mainly software reprogramable, we can use it for doing all sorts of whizzy things which could be tailored for our own environment. As I said earlier, I believe that as a consequence we will find ways of using this aircraft incredibly effectively in non-standard fighter bomber roles. I am happy to expand on that if you wish.

If you look at the alternatives, you will have either substantially lesser capability in terms of half-generation prior aircraft or something like the F22. The F22 is a very expensive aeroplane, but let me make a few comments about it. In my view, it is almost a half-generation, a sort of third-generation, prior to the JSF. I also agree with Alan when he said that many of the lessons from the F22 program have been taken forward and integrated into the F35, so it is a much more advanced aeroplane. I think there are enormous advantages. It is also a much more multirole aeroplane and it better suits our needs in terms of data gathering and its capacity to operate within a total network, and that is the way we will be operating. We can figure in all sorts of other things to make sure that the theatre environment—in fact, even the global environment—is much more networked than it has ever been, and that is the environment in which we will be doing almost everything, so I think it fits very well for us. I do believe it is more multirole.

The F22, as it is configured at the moment, is a fine air superiority fighter, but that is really about it. You can strap some things on it but it is not really configured to use them very effectively. The F35 is, and, because it is very stealthy on top, unless you hang external things on it—and, of course, you can carry a lot of things internally—it in fact changes the whole game. It has enough capacity to be very aggressive in taking on air defence systems, for instance—going into harm's way and winning. I believe it will be very effective in those sorts of roles.

There is another thing that I have not heard mentioned so far. I personally believe the F22 will be extremely difficult to sustain and maintain after about 15 years. Look at the numbers of aircraft that are being bought. If we bought it—that is, on the assumption that the Americans would sell it to us, and I think that is a very big assumption; I am very doubtful about that—it would be only the USAF and us. What would be the assumptions we could build in about sustaining that aircraft? Would it be all we bought? If it were going to be a two-type fleet, the logistic costs of running two aircraft types are horrific. I would suggest to you that that is something that we would best avoid if we could. I believe we have the option of avoiding it, so why bother going down that track when, frankly, in just about every measure, it seems to me that the F35 is a better choice.

Mr CAMERON THOMPSON—I was looking at scenario A and scenario B in the chart for simple people to look at. It struck me that, in your analysis, in looking at the make-up of the RAAF in the future, it all looks pretty good except if you are on board an AW&C aircraft. It says that you would have poor sustainability, which left me wondering: are there some deficiencies in the way we are looking at the provision of support for those aircraft? Are there some shortages there? I also note that, when looking at a five-squadron set-up, that is 120 aircraft, which is somewhat more than we are looking at.

Mr Connery—Firstly, the grain on the AW&C referred to aircraft losses. So, if one of the aircraft were to be shot down, you would essentially lose over a quarter of your effective fleet. That is what that meant. It would have a huge impact on the operation of the fleet. It is not to do with any maintenance issues or anything like that. On the second question of the 120—

Mr CAMERON THOMPSON—So are you saying that was not to do with risks to those aircraft; it was just inferring a higher risk to those aircraft?

Mr Connery—No. In fact, I do not think there is going to be a particularly higher risk of losing one in combat, but if one were to be lost either through a combat or a non-combat accident it would have a huge effect on the sustainability of the fleet. You would just have one less platform and therefore you could be in the air for less time, and you would have lost another valuable crew or part thereof.

On the issue of the numbers, we were really trying to look at three, four and five squadrons. We recognised that there was significant sensitivity about how big a squadron would be. For example, with the American F22, they are currently talking about having 18 to 24 aircraft in a squadron. We have worked on the premise of about 12 to 16 JSFs, based on the idea that our current squadrons operate on about 12 to 16 JSFs. But we recognise there is significant sensitivity about those numbers. So, when reading that number of 120, if you would just have a look at the issue of sensitivity and what could change that number, you would get a far better picture of the overall number of JSFs needed. Perhaps instead focus on how many task groups

you want, how many jobs you want it to be able to do at once, and then work out from there the numbers you actually need.

Mr CAMERON THOMPSON—The other thing I am interested in asking you to expand on is some of the additional roles you see as being new types of roles. Could you speculate on where that might take us?

Prof. Babbage—Let me just make a few comments, and I think there are others in the room who might be able to go further. Because the sensors are so good, we are now seeing, for instance, in Iraq, some fighter-bomber and other aircraft being used to monitor movements on and around critical routes. I think we are going to see a lot more of that. This aircraft is going to have far greater surveillance capability. There are all sorts of other things. For example, if you think of what we often call a littoral warfare environment—that is, a coastal environment where there might be a lot of islands—and the sort of complexity that can arise there, you may want to look for, say, fighter or other aircraft in the area and monitor what they are doing, and you can do that, but you might at the same time want to scan certain areas of the surface for, maybe, a convoy moving down the road or you might want to actually monitor something completely irrelevant. My understanding, from talking to some of the technical people, is that it may even be possible to reprogram the radar to look at, for instance, submarine snorkels or something really bizarre that you would not normally ask a fighter aircraft to do—it is not normally configured to do it—but, because the sensors are software-reprogrammable, it is technically feasible to do it. You might actually get quite good performance and, if that is all you have in the theatre, it could do a really good job for you.

So the point I am making to you is that I can imagine many circumstances where, let us say, Army or Navy in particular may not be in a shooting war necessarily but could want some security close by and they also want to see extra data streams and extra surveillance. An F35 will be able to give that whereas a Hornet or, for that matter, virtually any other platform of fighter-bomber would simply not be able to fill that niche.

So you could say that within the network, where there are going to be other surveillance sensors that will no doubt download data to you whether you are sitting on a ship or actually commanding a company or battalion on the ground, you will be seeing what is going on around you. Having the fine grain intelligence, which is super up-to-date, and maybe even imagery out of an F35 that is sitting 20ks behind you can be a terrific thing to have, especially if it all goes to custard and you suddenly want something dropped on something very fast. It is a wonderful capability to have up your sleeve. And it is quite different to what we have had before.

Mr Connery—If I can expand on that too. As a result of really thinking about how we can use this information, I see the JSF as being very valuable across the spectrum of conflict. I can see it even in disaster relief operations flying over, given clearances and the like, tsunami-affected areas to have a look at exactly what damage there is and getting data from the aircraft straight back to decision makers. There is a lot of work to be done to get the information there, but it is potentially viable. Similarly, up in the higher ends of conflict, this is going to be a capable aircraft there too, I am sure.

Mr CAMERON THOMPSON—You are talking about all these diverse capabilities. Is managing those going to be the job of the poor guy sitting in the seat—

Prof. Babbage—No.

Mr Connery—No.

Mr CAMERON THOMPSON—or can it be done remotely? Obviously, if you are suddenly talking about submarine snorkels and the guy has never had anything to do with that kind of parameter before, can it be done remotely so it is not bugging him at all or is it to be done by him?

Mr Connery—This is where it is really important to look at not just the unit cost of the aircraft but also everything that needs to go behind it. With aircraft sucking up this information, something needs to be done with it. You need a whole bunch of analysts back on the ground who are able to sit there and interpret it. To my mind, our current information interpretation system would not be able to cope with all the information or it would cope with only part of what was actually being produced by the aircraft. So thinking of the back end—what you are going to do with the information—is just as important, I think, as thinking about how many aircraft you need and what kind of aircraft you need. And you need to be thinking about that now so you can start training people and getting them prepared for these new roles.

Mr WILKIE—I think the information gathering component is a very important item to have, but, in terms of the perspective, a JSF or any platform that can disseminate and receive information of that nature, given its short range and high speed, would not really be able to stay on station for very long as opposed to other platforms, like Orions. Last October Cameron and I were both over Basra in an Orion. You can sit there for a very long time gathering enormous amounts of data and disseminate that. The JSF would not really be in the same league because it could not stay on station long enough. I am curious to hear your comment around that. Most of the other questions that I had have already been answered. Is it really the role of a fighter bomber to have that ability to stay on station and would you really expect another platform to do that?

Mr Connery—That shows you need a mix of platforms in order to do these things. The Orion is doing some amazing things in Iraq and providing a support. It is great. But no-one is shooting at it. It is able to loiter for long periods of time. Once the Orion gets the information, its ability to prosecute what it finds is quite limited. Somebody else has to be called in. The JSF may not be able to loiter on station for a long time but, if tanked, and given it is probably sitting there in a more passive role of just picking up information, it may have more ability than you are picturing there, given the right threat environment. Again, just to stress the point, you need a mix of sensors. You need to have different sorts of options available to you so that you can fit the best option into the situation you are faced with on the day.

Prof. Babbage—I have a small supplementary comment. I think there has been a little misinformation about the JSF's range and payload capability. I would simply say that I think it is longer than most people assume. I put it back in the network environment as well. You can do an awful lot with a fleet of JSF if you have the tankers, and we have the tankers coming.

I am a great fan of the P3s. The P3s may well be extended, and no doubt they are going to have a useful role for a long time. Looking at the longer term, I think, frankly, in 20 years we are going to be doing that sort of role with higher altitude UAVs, things like Global Hawk, pulling a

lot of data. This is the power of the network. That data will be fused digitally with other data from all sorts of multiple sensors and will provide you a picture of what is going on around you no matter what you are doing. That is our objective. It will change the nature, efficiency and effectiveness of our total operations if we can get it right. We have a long way to go, but I think we are going the right way.

ACTING CHAIR—In the interests of being fair, I suppose, and asking the hard question in terms of what interests there might be, as I asked one of the other participants, does the Kokoda Foundation receive funding from any company likely to benefit either from the JSF program and decisions by that if we get to it or the F18 upgrade programs?

Prof. Babbage—Not significantly. I am happy even to name them all, if you like, but the only company that is really directly involved in any sponsorship role is BAE Systems. They are a minor sponsor, but not of this project at all. They helped us bring someone to Canberra last year, I think. Jacobs Sverdrup Australia is not a supplier of equipment but has been involved in some consulting work in the broad field. It is one of our sponsors as well.

Mr EDWARDS—I have one more question. I want to refer to what the Australian ambassador had to say on, I think, Wednesday in the United States. Basically Australia's ambassador in Washington expressed strong concerns about possible delays and cost blow-outs of the proposed JSF. Some of those concerns centred around whether or not Australia would get access to the full secrecy details of the US JSF. It appears that the Brits have been able to negotiate something in terms of this secrecy transfer while at this stage Australia has not.

We are due to sign up for this aircraft. We have already invested something like $300 million in it. Does it concern you that we do not or may not have access to the full capacity of this aircraft—the full the capacity that the United States will? Does it concern you that we are about to commit to the most expensive purchase in the history of Defence in this nation at the same time we are still looking at what is a paper aircraft? I would appreciate your comments in relation to those matters.

Prof. Babbage—My view is that it is very important that we gain access to the capacity to modify and adapt this aircraft for our special needs. There are going to be times when we are going to need to use this aircraft differently to the way the United States will be using it, it seems it me. We need to be able to modify some aspects of it. We need to be able to maintain it, repair it and that includes some pretty sensitive issues. I do not think we have to have all the source codes and the deep source codes behind the fine bit of equipment. We need to be able to modify the sensor's software so that if we want it look for something else or report in a different format to fit in with something else on one of our Wedgetail aircraft or something like that we can make that happen.

I am not in a position to brief you on where the negotiations are at—you may want to ask others that—but I am aware that these are issues that are under way. I am moderately optimistic that there will be a successful conclusion on gaining the critical IP access that is required. On the costing matter, that is something that has to concern us all. The biggest risk is if the US program were significantly cut in my view. If it were cut then the unit cost potentially could rise significantly. On balance, I do not think that the JSF program is likely to be cut seriously. I think

the Americans need this aeroplane as much as we do. I think it is going to be bought in substantial numbers.

The other thing when you are looking at costs is you have to be careful you are comparing apples with apples. The way many of us tend to think about it is unit flyaway cost without too many other things hanging on. You have to look also at total program costs. There is no single measure which gives you everything. When you look at the latest costing that I am aware of, we have not seen a substantial escalation in the unit flyaway costs that I am aware of. We are still talking in real terms about what was being talked about in 2002. I am optimistic but I think we have to make sure that our interests are still safeguarded.

Mr EDWARDS—One of the big selling points of the JSF has been its stealth capacity. Do you have any comments on the likelihood of a stealth downgrade of the JSF in an effort to reduce costs?

Prof. Babbage—My understanding is that it is very likely that Australia will well and truly be able to obtain an aircraft which is in all respects comparable to the conventional take-off and landing aircraft that USAF will have in the sense of its stealth performance.

ACTING CHAIR—That has already been downgraded from VLOR to LO—has it?

Prof. Babbage—No. My understanding is that is not a real downgrade at all. I think what has happened has been a change in terminology. There is another explanation for that. My understanding is there has been no change in reality, but I suggest you ask other people for more details of that. My understanding is that it is not a change in reality of the performance of the aircraft.

ACTING CHAIR—An interesting aspect of this is that there is some terminological inexactitude going from low observability to very low observability. When you do the comparison with the Raptor, the Raptor is true fifth generation in terms of its stealth characteristics as we understand it. If you look at the GAO information and the questioning they have had of the department of defence in the United States, they make those comments in relation to the stealth characteristics. They also make the comment that it is just a change of what is being said. I do not know who to ask about that, but you might get to our department if you can.

Mr Connery—An interesting questions, Mr Edwards, might like to ask of others is: if F22s are going to be modified in order to send and receive data and have different sensors on board, what is that going to do to its stealth capacity? While I have no opinion or real knowledge of the difference between the VLO-LO issue that you have mentioned, I think that is an interesting thing to ask. If people want the F22 to do more than what it is doing today, what impact is that going to have on stealth?

Mr EDWARDS—I am happy to do that, although I must say I am much more interested in the stealth capacity of the JSF because that, not the F22, is the aircraft we look like buying.

Prof. Babbage—Let me also make the broader point that, when you look at the performance of our defence capabilities into the future and you project where we are likely to be in, say, 20 to

25 years time, a really important question is: will the JSF as we expect it to be configured be well and truly adequate to perform its roles with high security? I think there is absolutely no question about that; it definitely will be able to. It is far more stealthy than anything we or, for that matter, the region have ever seen.

Mr EDWARDS—I have no doubt that we will get some further information in relation to that.

ACTING CHAIR—Directly related to that there is a question of whether or not we will get the same kit as the US, given the significance of the stealth technology. There is a serious question mark over whether there will be the transfer of that technology in full. That is why the British have a major question mark about whether they are going to continue in the program, because they have not received those guarantees. There is also the related question of, if you do not know and understand intimately that stealth technology, your plane gets knocked up and you have problems with that—there is combat damage and so on—who is going to come and fix it. Will we or are we going to have to put a call in to the States and say, 'You guys come and do something with it'?

Prof. Babbage—I believe there is a basic question of sovereignty. This is something that our American friends have to come to terms with. Everything I have seen from the British side shows that they feel the same—they want the capacity to repair, refit in a modest way, upgrade and change the configuration of the sensors. I suspect the Brits actually want to do more than we need to do, frankly, for a range of reasons. But it is a very important part of the total package. We have to have clear assurances from the Americans on this before we sign up.

Mr EDWARDS—It is a point that you make quite strongly in your submission, of course.

Mr WILKIE—I was going to ask about stealth, but it has really been covered. My question relates to my interpretation of the downgrading of the stealth capability. It is really related to the engine, because you have such a large single engine putting out such a huge signature that they cannot really prevent that. Do you have a comment about that?

Prof. Babbage—I do not think I am qualified to give you a detailed answer to that. Of course on an F22 you have two big engines. I do not think that is the issue so much. I am not an expert, but I think it is actually more to do with what data you are sending out—you are sending out data rather than just pulling it in—and the frequencies and other things and what that does to your overall signature rather than with what happens if you stick one of these things on a post, which of course they do from time to time, and measure the radar cross-section and for that matter other signature cross-sections. I am not aware that there is a serious problem with the actual physical configuration of the aeroplane.

ACTING CHAIR—I want to finish with one very simple thing which has been raised before. The strengths of the JSF and anything else that is being looked at and the network-centric approach to warfare are also the weaknesses, aren't they? You have to have a multilayered approach to support, particularly with aircraft refuelling and, as you get out further into the sea-air gap, that whole project has to go further. The capacity to launch missiles against the support, whether against the AWACS or the air refuellers, is very significant. The question of terrific situational awareness does not get you very far if all of a sudden you cannot get back again. How

vulnerable do you think the total system is to that kind of attack because specific missiles will be bought and able to knock out the enablers in this network?

Prof. Babbage—These are real issues. We have to make sure the total system is sustainable, we can protect it and we can operate in environments that are really tough. The point I would make is—and it is a bit hard to explain some of the aspects in this forum in an unclassified way—that there are many new systems that are coming down the pipe, some of which are in space, which will provide enhanced situational awareness and contribute to the overall awareness. I am not saying there is absolute security in terms of whether it is possible we could lose a critical component like a Wedgetail in an operation. That is something we have to seriously contemplate. It is a possibility, but I think there are lots of ways of protecting them and lots of ways of putting in more layers of information to make sure we are not taken by surprise.

The reality is that the benefits that flow from operating within a network which has lots of fail-safe mechanisms within the network are so powerful and profound that trying to operate without it would really be nugatory. Frankly, you simply could not operate with anything like the same budgetary parameters or with anything like the same effect and precision if you did not have the situational awareness. So the network is really important. It is important that we make it robust, though, and that we make it enduring, and that we make it reach. I think that with our allied friends we can do that, but we have got a long way to go yet. We have also got to make sure that we do not focus just on platforms when we are thinking about defence investment. The network is very important—the whole ISR environment. It is critical that we foster that and continue to develop it.

ACTING CHAIR—Professor Babbage and Mr Connery, thank you for your attendance here today. If you have been asked to provide additional material, would you please forward it to the secretary. You will be sent a copy of the transcript of your evidence, to which you can make corrections of grammar and fact.

[11.57 am]

BINSKIN, Air Commodore Mark, AM, Director General, Capability Management-Air Force, Department of Defence

GUMLEY, Dr Stephen, Chief Executive Officer, Defence Materiel Organisation, Department of Defence

HARVEY, Air Commodore John, Director General, New Air Combat Capability, Department of Defence

HURLEY, Lieutenant General David, AO, DSC, Chief, Capability Development Group, Department of Defence

LOUGH, Dr Roger, Chief Defence Scientist, Department of Defence

McPHAIL, Air Commodore Roy, AM, Director General, Aerospace Combat Systems, Department of Defence

PEZZULLO, Mr Michael, Deputy Secretary, Strategy, Department of Defence

SHEPHERD, Air Marshal Geoff, AM, Chief of Air Force, Department of Defence

ACTING CHAIR—Welcome. Although the subcommittee does not require you to give evidence on oath, I should advise you that these hearings are legal proceedings of the parliament and therefore have the same standing as proceedings of the respective houses. Do you wish to make an opening statement?

Air Marshal Shepherd—Yes, I do. Thank you for the opportunity, once again, to speak with you today about the way ahead for the Australian Defence Force in the area of regional air superiority. We welcome the process whereby we can engage with the committee, as we do regularly with government. The defence capability plan makes sufficient provision to maintain Australia's air combat capability at a level at least comparable qualitatively to any capability in the region. Air superiority is extremely important and underpins all other military operations. Air superiority is my business, and it is my professional opinion that we have currently, and will continue to develop, the right balance between enhanced and network platforms and a highly skilled workforce to ensure that we remain the best air force in the region.

The government continues to monitor developments in the region, and were there a need, the defence capability plan would be adjusted accordingly. We acknowledge that we are already seeing the introduction of more sophisticated military equipment in Asia, but we assess future growth to be more in north-east and South Asia rather than in South-East Asia. In our region, we will see limited developments in fourth generation fighter aircraft, ground based sensors and weapons systems, and enhanced command and control and information capabilities. To ensure air superiority in this future environment, Australia will continue to develop our network enabled

force to exploit advanced air systems centred around a fifth-generation combat aircraft and the associated communications and information technology.

With regard to the current force, the FA18 is going through a series of upgrades that will provide a similar avionics capability to the new Super Hornet. These upgrades, when combined with new all-weather precision and stand-off weapons and supported by the new airborne early warning and control aircraft and multi-role tanker transport, will provide us with a formidable networked air superiority system of systems that is, without doubt, second to none in the region.

The F111 capability has been discussed extensively at previous committee hearings, and our current plan remains to retire it once the FA18 upgrades are complete, and before the new air combat capability is introduced. We need to do this in order to free up people to safely and efficiently introduce the new air combat capability.

The future air combat capability, currently envisaged to be the F35 Joint Strike Fighter, will be a quantum leap. The F35, as you have heard, will be a highly capable fifth-generation stealthy multi-role air combat aircraft. Defence is confident that this aircraft will cost effectively provide Australia with the most sensible air combat solution and, when integrated into the networked force of AEWC and upgraded ground command and control systems, will mature to meet Australia's future air superiority requirements.

Let me stress again why the F35 is the right choice: it is a true multi-role stealthy fifth-generation strike fighter. It will be, as you have heard, as much a sensor as it is a shooter, and it is well-positioned to achieve effects based outcomes. We are testing and modelling every aspect of this program to ensure the JSF meets our needs. We are a smart and informed customer. It has a high degree of interoperability with our allies, providing a plug and play capability into the wider coalition network. In short, we are convinced that it is the best aircraft to do all the jobs that Australia needs. And it will be at a cost that will allow the balanced development for the ADF of a broad range of capabilities in all environments—land, maritime and air—from humanitarian assistance and peacekeeping through to high-end war fighting.

There is a view presented by some defence enthusiasts and commentators who believe that there are other options available to provide a viable air superiority capability. Central to your inquiry today is the discussion on the F22 and keeping the F111 alive. So why not the F22? In our view, it is expensive and the limited numbers provided by the budget would not be enough to provide adequate air superiority coverage. Analysis and commonsense show that 30 to 40 airframes, no matter how capable they are, will not be enough to defend Australia. Buying it would distort the balanced defence capability plan. Even if we could afford it, and even if—I repeat: even if—it is released by the US government for export, it is primarily focused on the air-to-air roles. It is essentially a single purpose platform. It has a limited utility in strike and even less utility and capability for offensive air support. It will most probably require an upgrade to address obsolescence issues and there is no Australian industry base to strategically support the platform.

Clearly, if we bought the F22 we would need to have another aircraft for the vital and complementary strike and offensive air support roles. Some have proposed an upgraded F111 to fulfil those roles. I have over 2½ thousand hours flying the F111—that is where I got this grey hair and a few stories. As the sole operator of the F111 in the world, we have an excellent

understanding of what it takes to operate and maintain it. We know there are significant issues to be addressed to extend its life. Importantly, we need to look at the total risk involved with extending the operational life of the F111. There are increasing and unknown structural and systems risks with the wings, the airframes, the electrics and the hydraulics as the platform nears the end of its fourth decade of life. There is an avionics and capability risk with respect to obsolescence and the ability of the aircraft to be competitive in the complex future air defence environment. We would need to do a massive avionics, weapons and electronic warfare upgrade to make the aircraft even adequately operationally capable and survivable. Importantly, even then, it would not match the strike capability of the JSF.

Add to this the ongoing costs of maintaining a dual fleet, half of which would be an orphaned system, and the associated training and logistics systems supporting both types. When we did the avionics upgrade program on the F111 in the 1980s and 1990s, we piggybacked on the similar US Pacer Strike program. This time we would have to go it alone, and that introduces industry risk. We know completely the ability of Australian industry to support this aircraft now, and we are not sanguine at all that a major upgrade would be achievable and supportable within Australia. Any upgrade would also be expensive—in the order of five to eight billion dollars possibly—and would require additional funding on top of that for the F22. It would bring with it the strategic risk of a distorted and non-balanced Australian Defence Force.

In very simplistic terms, what is being proposed by some can be likened to taking an EH Holden—a good car in its day—reworking it from the ground up, calling it a V8 Commodore and expecting it to win first time out at Bathurst. When you add up the structural risk, the system risk, the support risk, the financial risk and the overall risk to capability, you have a clear and undeniable question about the viability of the F111 beyond the period when we plan to withdraw it. And all these risks increase as the aircraft ages.

At the end of the day, my job and the job of all of us here is to minimise strategic risk for Australia. Clearly, to go down such a path with these sorts of costs is irresponsible, and the funding pressures would put at risk our balanced land, maritime and air capabilities. We need to decide when to retire the F111 so that we can manage the transition to the new air combat capability without risk to our overall capability—not be forced to do it at an indeterminate time of the aircraft's choosing. We need to confidently plan for our future, not leave it to chance.

As Chief of Air Force and the senior professional airman in Australia, and with an extensive fighter and strike background, it is my professional opinion that the government's plan to enhance the current air combat force and to then acquire a cost-effective fifth-generation system is the smart and responsible way to ensure a strong air superiority capability. Importantly, the coupling of the proposed capability with effective land and maritime forces will ensure a balanced ADF into the future—an ADF that is capable of responding to all contingencies from humanitarian assistance through to high-order war fighting.

I have introduced our panel of Defence members, and they are all experts in their field. We will answer, within classification constraints, any questions you might have. I will now ask Mr Michael Pezzullo, Deputy Secretary, Strategy, to set the strategic scene.

Mr Pezzullo—Thank you. Mr Chair, I might just add some comments to what the chief has indicated. I would like to spell out the strategic basis upon which these decisions are being taken,

both the decisions that have been taken in the recent past in relation to getting into the JSF program and future decisions that need to be taken about the strategic framework upon which that is based.

The government's outstanding guidance for Defence is contained in the Defence white paper 2000. That lays out the foundational basis upon which we do all of our planning, be that for air combat or other capabilities, and it certainly guides the work that I do and the work that General Hurley does down the line from me in terms of developing capability strategies for government consideration. There have been two updates, as this committee would be well aware, to that document, but the fundamental policy, as the Prime Minister reaffirmed last December, remains the Defence 2000 white paper. That is what we have to go on. We are not military or aviation enthusiasts who just go off in the blue sky, if I can dare say that, and design our own capabilities independent of government direction. Government direction, of course, is informed by professional advice that we provide to them.

The government has laid down quite clearly what it requires from us in terms of air combat capability. The white paper determines that Defence will maintain and further develop and integrate and balance a joint force comprised of principally maritime capabilities—which is to say mostly air and naval forces—that can defend Australia by denying the air and sea approaches to Australia by any credible hostile force. That is on the public record; it is unclassified information. It also requires certain other things from intelligence capability, strike capability and land forces that are not directly germane here, although they have a bearing when you look at the totality of how we achieve military effects.

The white paper spells out in quite some detail in chapter 8 the air combat capability goal that the government requires of Defence. It is the ability to protect Australia from air attack and to control Australian air approaches to ensure that operations against any hostile forces approaching Australia would be successful. The aim is to maintain the air combat capability at a level that is at least comparable, qualitatively, to any in the region. Other parts of the white paper, and the submission presented to this committee by the Air Marshal on behalf of the wider Defence organisation, make quite clear that the white paper guidance in relation to the definition of 'the region' means our immediate region: sea and air approaches and environs to our north in the archipelagic region. We need to be able to maintain a sufficient marginal superiority in that region to provide an acceptable likelihood of success in combat. That is all quite clear cut.

When I review the status of the project, it is my job to look at how the project is tracking, but not so much against technical capability requirements that the Chief of Air Force is obviously concerned about or the sort of cost and schedule concerns that Dr Gumley would be concerned about. My job is to match it up against the direction that government has given us. In terms of a fifth-generation stealthy and networked capability that meets those strategic tasks that I have just spelt out, which really just reproduce language out of the white paper, this is in fact the only option at the moment that makes any reasonable sense on a capability, value for money or cost effectiveness ground. If that were not the case, I would not be marking it as being appropriate against our strategic basis for our planning.

The chief has touched on other proposals and options that are before us. I do not want to go too deeply into another submission's context, but it would really be failing in my duty to this committee to not draw your attention to the strategic framework and the basis that underpins the

presentation made to this committee in another submission. It is the most extensive submission that you have. It is a very interesting, comprehensive and well-researched submission. If I can put it in a nutshell, and not to draw too fine a point on it, it is predicated on a strategic framework which is radically different from what the government direction to us is. It is predicated upon taking on a very complex air capable enemy. It makes mention of particular regions, and maybe even particular countries, from which such a force would be generated. By sketching out as it does the parameters for making a strategic decision of quite a different nature—not unreasonably, from the point of view of the authors, I suppose—it not surprisingly comes up with a different kind of option.

The scenario—and it is scenario based—that ultimately is embedded in the alternative submission is predicated upon a massive erosion of US military and strategic capability. It is predicated upon Australia having to operate independently beyond our immediate regions as I have defined them in my earlier remarks. It is predicated upon a radically different set of strategic circumstances which, I must say, I do not necessarily see even in the most speculative parts of my crystal ball. The scenario sketched out in the comprehensive submission that you have before you from another party would require, and therefore by definition there would be, a strong element of lead time and warning time be available to us. It would require government of whichever persuasion to radically rethink the scale of its defence budget and the level of investment, particularly in capital. It would require Australia to become self-reliant in a much larger force. It would also require—and I think this is the most problematic set of assumptions—that our access to the alliance capability and interoperability that we seek to have with our US alliance partners, in a whole range of scenarios and contingencies, be extinguished almost to zero. The only basis upon which I could see that arising would be through a massive political rupture in the relationship. It would also require a massive erosion of the US military capability edge which, again, I do not foresee even in the most speculative parts of my crystal ball.

Can things change? Yes, absolutely. What is our job as professionals? Our job as professionals is to employ warning time to provide quite fundamentally different strategic assessments to government of whichever persuasion happens to be in office at the time. In radically different strategic circumstances we would provide radically different advice. No doubt the Australia government of the day would provide a direction to Defence to employ a radically different strategy.

ACTING CHAIR—Air Marshal, does anyone else want to make an opening statement?

Air Marshal Shepherd—Mr Acting Chair, we are open for your questions.

ACTING CHAIR—I will start with a technical one. Some time ago, last week, the committee forwarded to Defence a series of fourteen specific written questions. Do you have written answers to those questions to give to the committee?

Air Marshal Shepherd—I understand that we do. I will ask Air Commodore Binskin, who has been acting as a sort of secretary for this group, to address that.

Air Cdre Harvey—Mr Acting Chair, we have those written responses here. We can address the questions now as well if you wish.

ACTING CHAIR—If we could have the responses—we can arrange that with the committee secretariat—as a starting point, that would be useful. We may come back to them a bit later. We will go to Mr Edwards for questions.

Mr EDWARDS—I was hoping to have a look the answers to those questions which we put, because they may lead to further questions. But I do have a number of other questions. Air Marshal, it was encouraging to see your enthusiastic appearance here this morning, and I am pleased that you are delighted to be here yet again. This committee considers the issues dealing with our terms of reference to be crucial issues to the nation now and well into the future. We do not have the technical capacity to decide, for instance, whether we should be purchasing an F35 or an F22. We therefore have to rely on people like yourselves to get it right.

There is considerable criticism of the Air Force's attitude in relation to many matters to do with the JSF. I would be appreciative if you could tell me, for instance, why it is that many people in the ADF appear to be so hostile to the arguments put by Kopp and Goon, and why it is that many people in the ADF appear to be hostile to both of those individuals. What is it that they are saying that gets up the nose of ADF?

Air Marshal Shepherd—I would rather not have a discussion around personalities. We in the Air Force share your concern for this vital aspect of our endeavour and vital aspect for the nation, and we in the Air Force believe we are professional in what we do. We know the value of the capability we have now; we also know its weaknesses and the threats that are before us in the sense of maintaining that capability into the future.

We do not believe we are the only informed people within this country. We believe there is a range of informed debate out there. A wide range of informed debate is a great thing for the nation. As the chair has said, this is a most expensive Defence purchase, and we need to make sure that it has a full, free and frank public airing. Nevertheless, we are aware of information, of course, with a classification level that means that it is more available to us than it is to the open public. Certainly there is no institutionalised antipathy to any informed debate. Those are not the values we espouse as an air force. People individually are people individually, and they have their own view of the world; but as an air force we corporately welcome informed debate. We corporately welcome being able to sit in front of you today and explain this project, and I can assure you that there is no institutionalised antipathy towards anyone.

Senator FERGUSON—Mr Acting Chair, as a committee member, I am totally unaware of the committee sending any written questions to Defence Department. When did the committee send these questions?

ACTING CHAIR—I suggested a series of questions to the chair and said that it might be useful to ask Defence if they could provide answers. A large part went to questions in terms of cost, when we did the Defence annual budget, how you would actually work out the fly away cost—

Senator FERGUSON—I only ask because, as a committee member, I am not only unaware of the answers; I am unaware of the questions. It is making it rather difficult for some of us on the committee to have any input when we do not have any idea of what was asked of the Defence Department.

ACTING CHAIR—And it may be another reason, in terms of the amount of time we have got. The secretariat cannot, when he is copying the answers—

Senator FERGUSON—I hope they are copying the questions too.

Air Marshal Shepherd—Mr Acting Chair, would it help if we were to give a quick verbal summary of the questions and answers?

ACTING CHAIR—Given our time frame, why don't we look at that as a next step after a series of questions from Mr Edwards.

Senator FERGUSON—I am sorry, Mr Edwards. I just was not aware of these questions.

Mr EDWARDS—I want to turn to some of the points that were made in the ASPI paper, going back to February 2004. But I have two shorter questions which I would like to put. Firstly, Air Marshal, given the risks that you have described associated with the extension of life of the F111, why is it that we are considering extending the life of the F111 through to 2010 or 2011, given those risks?

Air Marshal Shepherd—There are increasing risks. Those risks increase with age. We believe we have those risks managed up to the planned withdrawal date. We have stated that to be in the 2010 to 2012 region, depending on the upgrade of the Hornet and the associated projects around that.

There is no simple break line or death point. The risks increase as time goes on, and we need to look at what we can do to mitigate those risks. Clearly, if the upgrade to the Hornet proceeds as we hope and expect, and all the other associated projects with weapons improvements, AWACS and tankers, proceed on track, then we are able to get out of that increasing risk curve at a time of our own choosing. If the Hornet upgrade were to be delayed slightly or if it were to slow down, or if all those other projects do not come in quite on time, then it is not the fact that on 3 July 2010 we need to get out of the F111 business. We need to make sure that we can ameliorate those risks for the next period that we may need to extend the aircraft. But if you look at it over a longer-term period—say to the end of the next decade or beyond—then those risks become quite substantially greater than what they are today. If you look at a short period—over six months, a year or even two years—those risks increase marginally.

Importantly, we do not know what we do not know. We know, from operating a number of ageing platforms—the 707, the F11 and others—that ageing platforms can give us technological surprises that we cannot foresee. To date, we have been very good in managing those risks and in coming up with technical solutions to those risks. I might ask Dr Lough to explain a bit more about that in due course. We need to be able to get off that increasing risk curve at a time of our own choosing.

Dr Lough—I suppose the issue with the department's position with the F111 life of type is really based on three undeniable facts that are all interrelated. The first one is: it is an old aircraft—40 years plus or minus a few years, which is old by aircraft standards and positively ancient by combat aircraft standards.

The other point to note is that at the time it was designed and built, it was at the bleeding edge of technology. It is a very good example of engineering practice at that time. For those of us who have seen the lid off an F111, it is marvellous engineering. The issue with that bleeding edge technology at that time is that it is very complex, it has lots of moving parts, it has lots of replaceable parts. The third undeniable fact is that we are the sole owner and operator of the aircraft. We cannot turn to anybody else to help us manage the aircraft. In the past several years, as a result of the sole operator program and even before that, we have learnt an awful lot about how that aeroplane operates. There is virtually a whole division down at Fishermans Bend in my organisation that is devoted to doing this.

So we have a handle on strategies for managing those issues that we know about, specifically in the structural and technical areas. We have strategies in place to be able to manage that, but remember that the risk, as the air marshal said, still increases with every passing year in how those strategies can get implemented and the risks associated with those strategies. We can see ourselves reasonably clear to making a reasonable, confident assumption that we can manage those issues out to 2012 and, in some cases, a little bit beyond.

The second issue of the strategy is those issues that we do not know about but we can anticipate. The aircraft has a test called a cold-proof loading test, and we are reasonably confident that, in the near future, one or more aircraft will fail that test. Essentially, that is really bringing up a new set of issues that we will have to manage, and that includes downtime and substantial cost that is associated with it. The chances of it failing that test increase with every passing year.

The third area that the air marshal mentioned concerns those things that we do not know that we do not know. Essentially, with the sort of stored memory bias there, with every passing year that an unanticipated problem does not occur the chance that it is going to occur next year increases. Therefore we have a sort of accelerating risk building on risk issue that we really just have to manage. Those are really the risk arguments and our judgment is that we can responsibly say that we can manage the risks up till around 2012.

There are other aspects in terms of managing it past that in terms of the life of type of replacement parts, and Air Commodore McPhail can give you a list of issues regarding how parts will or will not be replaced or can or cannot be replaced. I can give you one example from my technical expertise. It is the rocket motor for the ejection system. The F111 does not have an ejection seat. The whole crew module gets ejected and there is the rocket motor underneath that does that. Rocket motors are very well produced to very exacting quality assurance standard and, in this case of course, it is a safety critical system so it is a very high safety and reliability standard. The rocket motors have a safe life of 20 years. The last one that we have was manufactured in 1997 but most of the ones that we have were manufactured in 1994 or 1995. That means that they run out of life in 2015. If we want to take it beyond that—and that is the real extreme—we would have to go and start up a defunct production line, and who knows what the cost would be even if they could do it.

There are other issues associated with exotic materials that were in use at the time in the late 1950s and early 1960s that pose unacceptable OH&S issues today—things like beryllium and stuff like that. So fundamentally, the issue with the F111 life of type is one of acceding to risk and managing risk out to 2012 and having that risk becoming increasingly uncertain beyond

2012. Then there is the additional fact that when you get past 2012 the issue of being able to get certain replacement parts becomes increasingly difficult, notwithstanding that we have got as many as we can from the desert. They would have to be re-manufactured.

Mr EDWARDS—Just before I go to this ASPI report, can you tell me what percentage of F18s forced landings have been due to engine failure? If you do not have that, I would be happy to take that on notice.

Air Marshal Shepherd—I will ask Air Commodore Binskin who until late last year was commander of our Air Combat Group. I know of no F18 forced landings with double engine failures.

Air Cdre Binskin—If we are talking about double engine failures, I know of none. But if you are talking about single engine failures and aircraft that had to return with an engine shut down or at idle, we would have to get that data through our flying—

Mr EDWARDS—I would appreciate it if you could. I would be interested in the answer.

Air Marshal Shepherd—It would be a figure that was quite low.

Mr EDWARDS—In terms of the public debate, I just want to refer to the ASPI report, which says:

> Naturally, some capabilities and requirements will remain classified, and requirements are subject to ongoing refinement as analysis continues. However, Defence needs to publicly specify, in detail, the capabilities of the JSF that make it the preferred solution for Australia's new air combat capability.

There is a strong view in the community that Defence has not done this. I ask for your response to that.

Air Marshal Shepherd—You quote an ASPI paper from early 2004. I will quote an ASPI paper from August 2004 written by my predecessor—

Mr EDWARDS—I have read it, yes.

Air Marshal Shepherd—That I think is a public releasable document. It is an excellent document and it still stands true today and it is out in the public arena. In that document Air Force and Defence have enunciated clearly the capabilities we see the JSF bringing to the table and the capabilities the F22 would bring to the table and the reasons we believe that the JSF is the better platform. We have made a public submission to this committee and we have made public statements in Senate estimates committees. So, yes, we are not travelling countryside doing dog and pony shows but we are on record in the public arena with the roles that we expect the aircraft to perform and the systems and the capabilities the aircraft has and the reasons we believe that it is the best platform.

Mr EDWARDS—That is the paper you refer to written by then Chief of Air Force, Air Marshal Angus Houston, in which he says:

The F/A-22 will be the most outstanding fighter aircraft ever built. It may even represent the end of the line in manned fighters. Every fighter pilot in the air force would dearly love to fly it.

I want to turn to the submission that was given to this committee by Dr Dennis Jensen MP. I really appreciate the submission that we received from Dr Jensen. I think it goes to some very telling points. He says:

The decision to bring the F/A-18 Hornets into full service over the acquisition of the F-22 is a significant decision which should only be taken ... with the full consideration of all the current and future capabilities in our region.

I have recently attended a briefing provided by the Department of Defence in respect to the F-35 JSF combat package. This presentation did not deliver on the level of information required to make such a decision.

Time means I have to jump forward a bit, but Dr Jensen makes this suggestion in his conclusions:

The Defence Science and Technology Organisation (DSTO) should conduct an analysis of the number of F-22s that will be required to meet our capability requirements.

The issue of retirement of the F-111 and the early supplementation of F-22s into this strategy needs to be considered in the analysis that DSTO undertakes.

He makes that conclusion in light of his view that the purchase of the JSF requires reconsideration. I ask for your comments on that conclusion, and I apologise for presenting it in shorthand.

Air Marshal Shepherd—That is all right. I do not have Dr Jensen's submission in front of me. Dr Jensen has his view, which is a view I do not share. It is a view that the department and the Air Force do not share either. I will ask Lieutenant General David Hurley to talk in a minute. He was at that presentation, I understand. We have done an analysis, but it is important to remember that the F-22 will not meet all the roles that we require in the air environment. It is a single role platform predominantly. We need to have a complementary platform to do strike and offensive air support. There are options other than just the F-111, but they all come at increasing cost and increasing strategic risk of an unbalanced ADF.

Lt Gen. Hurley—I will comment on the presentation that Dr Jensen refers to. I gave the presentation with one other member from the NACC, new air combat capability, team. It was probably my naivety, but I thought I was going over there to brief a group of backbenchers who were not aware of what the JSF program was about, so we gave an unclassified briefing on what the JSF program is about. Dr Jensen and a few other members there were much more technical in their approach to their questions, so we rearranged the briefing for that backbench committee, took up the classification level and delivered a much more amplified, concentrated and informative briefing to them. It was a misreading of what was required and the level of understanding of the audience on my part on that day.

Senator FERGUSON—That would have been given post the submission that was presented by Dr Jensen.

Mr EDWARDS—I have two further questions and then I will have to shoot through. The United States Government Accountability Office report from April 2005 notes that cost blow-outs with the JSF could see the unit price reach $100 million. Why is the figure so much higher than the $45 million regularly quoted? That is the first question. The second question relates to the stealth capabilities moving from very low observable to low observable. Could you bring us up to date with whether those changes are actual changes or just changes in terminology? If they are actual changes, what difference will this make and how much more easily will the JSF be detectable?

Air Marshal Shepherd—I welcome the opportunity to do that. I noticed in the previous submission that you had difficulty in getting to the bottom of that. I will ask Air Commodore Harvey to address both issues of price and low observability.

Air Cdre Harvey—I will address the first issue of cost. The current officially released price of—and I have to be careful of the terminology—the average unit recurring fly-away cost for the conventional take-off and landing variant is $US45 million in 2002 reference dollars. That is the benchmark figure. I believe that the potential cost discussed was actually a procurement cost that included a whole range of support equipment as well. So we have to be careful about the costing basis there as well. I also notice that submission No. 20 to this inquiry talked about JSF prices and they managed to get confused between now year dollars and then year dollars. In fact, their price was inflated by over 40 per cent of the real cost. The current cost is $US45 million in 2002 prices and any escalation above that is possible, but the numbers being referred to cover such things as all the broad support costs et cetera for the program.

In terms of the stealth characteristics of the aircraft, just this week the JSF Project Office changed the public releasable slide, which shows that it is very low observable. The issue that I have expressed and tried to explain to the press on any number of occasions is that there is no change to the capability of the aircraft. There was a change in the terminology on one slide of the publicly releasable PowerPoint presentation. There was no change to the capability of the aircraft.

Senator JOHNSTON—Air Marshal, I thank all your personnel, Defence, DMO, the Capability Development Group and DSTO for turning out, as you do, when we all want to know about our most expensive defence acquisition. As I understand it, it is also our most complex defence acquisition. Dr Gumley, you are probably aware of the sort of question I will ask. What mitigation strategies are we going to employ? The lines of code are beyond anything we have endeavoured to deliver before. What mitigation of the risk are we going to employ to make sure that we do not get hung up? We were successful with Wedgetail, which was difficult. Can you give me a bit of a glimpse into the future? I have heard some good things this morning about the project to this point. In the next five to 10 years, we have some big challenges ahead of us. What are you going to do to manage that risk?

Dr Gumley—The aircraft development will go ahead in phases. We are still on track for first flight in the fourth quarter of this year. That is a very significant milestone. Of course, several million lines of code will be required just to get to that point. The vast majority of the code is for the sensor suites and, with the architecture of the aeroplane, it will be a matter of rolling out each sensor suite in, if you like, blocks. I would predict that occasionally a block might get a bit delayed, but we would still have an operating aircraft flying. It also takes time to train pilots, so

probably not every capability in the JSF would need to be immediately available on day 1, because it just could not be used. So there is a little bit of schedule contingency in there from a practical sense.

Air Cdre Harvey—The DSTO has done detailed analysis of the avionics architecture and the software approach for that. Their assessment of the approach is that it is very sound. They have learnt from other programs, such as the F22, in trying to extract the software layer from the hardware layer to allow them to do such things as upgrade processes as they go through. There is a very large amount of commonality in the software—reusing the same software on the aircraft that they use on the simulators et cetera. Most of the JSF systems are already flying—the radar is flying, the distributed aperture system is flying, the electro-optic targeting system is in test and countermeasure systems are flying. A lot of things have happened already in the program.

Dr Gumley—That is an important point. The JSFs, in some ways, as far as the systems are going, are a derivative of the F22. In other words, a lot of the hard yards have already been done in many of the systems on the F22 and they are now being adapted and modified for the F35. That leads you on to the conclusion. The F35 is a more advanced aircraft than the F22 because it will be taking both hardware and software a lot further.

Mr EDWARDS—As I have to go, I thank you, Air Marshal Shepherd, and all your team for being available. I will forecast that, from reading your submitted responses to the questions, more questions will certainly be asked. I really think that this committee will at some stage need to reconvene. That will happen at the appropriate time.

Mr CAMERON THOMPSON—I want to address some of the questions about the varying reports about costs of F22s. On figures that I got before from a gentleman in the press, they had a price—I notice in your response to the deputy chair's questions you had an average unit procurement cost for the F22 of $175 million per aircraft in 2005 prices—of $370 million per aircraft. If it were the $175 million figure, would it be anticipated that a purchase price for an outside party would be above or below that?

Air Marshal Shepherd—I will ask the expert members to address that point but I stress again: the F22 will not do all the jobs we need it to do. It is only part of—

Mr CAMERON THOMPSON—I am not saying that it does.

Air Marshal Shepherd—the cost equation.

Dr Gumley—There is range of prices that the F22 might be sold to us for. No negotiations or discussions have ever been had on price, but we get some indication from US congressional data on how much they are paying for their aeroplanes. The range is anything of the order of $US105 million to $US115 million per copy. But additional to that, if we were to acquire planes like that, we would be paying substantial update costs. The aeroplanes coming out now are already in need of update in some areas because they have been out for many years. There are FMS costs, which is the charge the US government charges Australia to process the orders. Sometimes they waive those fees; sometimes they do not. We have not had the discussion yet but there is always the question of: do we have to pay our share of the past research and development and bringing it into manufacture? What is our share of the amortisation?

The Americans will have about 183 or 184 F22s by the time they finish their program. If we were to get 40 or 50 then we would be paying probably 20 per cent of the R&D costs of that aircraft. Maybe that will be waived it; maybe it will not be—we do not know—but that would add up to an extra $100 million per aeroplane.

Mr CAMERON THOMPSON—That was the point I was pursuing. The figures quoted took the total cost of the program, divided up by the number of aircraft and came up with this average unit procurement cost. Despite whatever congress might have been told about the per unit cost, would it be anticipated on previous examples of other types of aircraft that have been dealt with over the past that we would have to pay above or below that average—in other words, would we have to pay the share of the amortisation and all those other things ramped up for the fact that it is a unique plane?

Dr Gumley—I stress: we have not had that discussion.

Air Marshal Shepherd—I will pass to Commodore Harvey but I stress again: it is still US legislation that this aircraft not be released, so we are unable to engage with the US—not that we want to. We believe the JSF meets our requirements more than the F22, so our estimations are exactly that.

Air Cdre Harvey—The lowest figure we see published about the unit recurring flyaway costs of the F22 towards the end of the production line is about $US110 million. That is the absolute minimum the US is paying, so no-one could buy it for less than that. As Dr Gumley said, you roll in on top of that all those additional charges so, let us say: even at the lowest possible price with no additionals on top, it is more than twice the expected price of the Joint Strike Fighter.

Lt Gen. Hurley—I think it is important to stress that there will be an upgrade program required for the F22, so if you look at the alternative model you have two aircraft fleets in upgrade. Where is the risk?

Mr CAMERON THOMPSON—I understand. I am merely trying to wade through that particular side of the argument. Another part of the argument touched on by colleague Dr Jensen in his submission concerned me a little. We are going down a process where we are seeking to gain the benefits of this network-centric warfare. He raised the question of: what happens if the network datalinks are able to be jammed? Is that an issue that is possible, and what happens in that kind of scenario?

Air Marshal Shepherd—I will ask Dr Lough to address that in a minute. I make the point up front that we are already in a network-centric environment; we are already operating in that environment now, and we will move substantially further into that environment—take a quantum leap into it—with the upgrade of the Hornet and the Vigilaire ground command and control systems and the introduction of the AWACS. We are already in that situation. It is not as if we are starting from nothing and going into a brave new world with our eyes wide open. We are already in that environment; we are already subject to those sorts of constraints and threats. Roger, could you address that technically, please?

Dr Lough—All network-centric warfare systems have been designed, or at least have taken cognisance of, the fact that they need to work in an electronic warfare environment. The system

that is surrounding the JSF is no different. It is not just a question of putting a jammer out there and having the whole system go down. The data links are frequency agile and they generally have a low probability of intercept in many areas. Therefore, the technical requirements to fully jam that sort of capability are such that a jammer has to be very close and very powerful to be able to do that sort of thing.

In essence, when you do the force on force analysis, it is highly unlikely that a jammer will be able to get the sort of capability to be able to do that very large jamming in most network-centric environments. Fundamentally, network-centric environments, especially the one for the JSF, are designed with an electronic warfare countermeasures process in mind.

Senator FERGUSON—I must say that this inquiry from the start was intended to be one into maintaining our air superiority in the region. In fact, it seems to have got to the stage where we have spent most of our time revisiting a decision that was made by the government some time ago, the decision to purchase the JSF. We had the argument before the JSF was decided on, and it seems as though it has now become a continual argument as to whether or not the right decision was made, and I do not know how long we can do that.

ACTING CHAIR—Probably until a final decision is made.

Senator FERGUSON—It is well underway, and the government has made the decision. I must say that I was heartened to hear the evidence of Dr Stephens and the Kokoda Foundation, because it is the first time I have heard at an inquiry like this people outside of previous players without any vested interest put forward a position, and in answer to the direct question they said they that thought the JSF was a good choice. I am going to go past that, because that is the decision that has been made.

The only niggling doubt that I have as a lay person—and there are probably only two members of parliament in the whole of this place who understand all of the technical details of what is required—is this: I need to be assured that, in the event of us continuing down this path and in the event of slippage when it comes to the delivery of this aircraft, we have some fallback position. The F111 is a prime example—we got them into service a lot later than we expected to. While there might be a capability for some slippage, if there was to be a lengthy slippage I do not understand exactly what the fallback position would be or how we would fill that gap, and we need some certainty there.

Air Marshal Shepherd—You are correct to have that concern. We are, as I said, an informed customer. We are fully engaged in the program and all the indications to date are that the program is proceeding on track and on time. Uncertainties can arise and situations can happen that cannot be predicted, but we can only work on the information we have, and we are quite confident that the project will proceed on time and mature to what we want.

What is our plan bravo? As we upgrade the Hornet—and we are well into that program now and that will be complete by the end of the decade—we will have a far more capable platform, as part of a network of systems, than we have now with the Hornet as it is now and the F111. That is important to realise. The upgraded Hornet will give us a better capability than the one we currently have with both the standard Hornet and the F111. There is potential to extend the life

of the Hornet. Centre barrels were mentioned in a previous submission. We need to continue to do the analysis on how many centre barrels we need to upgrade.

Senator FERGUSON—Centre barrels are quite expensive.

Air Marshal Shepherd—I will ask Dr Gumley to talk about that. There is provision in the defence capability plan to accommodate that. Dr Gumley can talk about costs and business pressures there. Certainly the year that the JSF comes in will determine how many centre barrels in the Hornet we have to do and how far out we have to take the Hornet. Nevertheless, we cannot keep the Hornet going for an extra 10 or 20 years. So there is a band of slippage in there that is within our current planning to accommodate. Any slippage of a major type—and I am using very rough figures—of, say, five to seven years, I would like to think that we would already see indications in the program that that would happen. We are not seeing that. That would be a fundamental failure of the program. We do not expect that to happen.

Were that to happen, this project is still called the 'new air combat capability', and I suppose we would need to start looking at other options at that stage. But I stress to date, and Air Commodore Harvey might like to update you on the program's progress, that we are not seeing any indications that there will be any slippage at all at this stage, much less substantial slippage.

Air Commodore Harvey—As you know, we were aiming to have the first aircraft in 2012 and to achieve initial operational capability in 2014. Those are not hard dates. We continue to look at the F18 life and how the JSF program is progressing. There will be at least a five-year overlap between JSFs—assuming we decide to buy them—and the F18 anyway. So we have a fair degree of flexibility in that. We have a current plan with a current target, and we look at the most cost-effective way of keeping the air combat capability as we go through. We have very good knowledge about how the project is going, and we have confidence that the aircraft can be delivered on our current target dates. But slips are possible, and we manage around that.

ACTING CHAIR—There is a directly related supplementary question, from Mr Wilkie, who has had to go to Treaties: if there is slippage, would you consider postponing the retirement of the F111s or would the upgrade of the Hornet—

Air Marshal Shepherd—Thank you very much; I was just about to talk about that. The answer is no. We need to get out of the F111 business. It is linked to the JSF in the sense that we need head space to move from the F111 Hornet environment into the upgraded Hornet environment and then into JSF. We are not transitioning from F111 to JSF. We are upgrading from F111 and current Hornet to an upgraded Hornet and then to JSF. We need that head space, in a constrained system, to be able to do that. We are getting out of the F111 business not based on when the JSF comes in but on how the increase of the sum total of the risks of the F111 game play out. That is why we are getting out of the F111 business in the 2010 to 2012 time frame.

The F111 withdrawal is directly tied—and we are on the public record in a number of venues to say it is directly tied—to the Hornet upgrade program, the weapons improvement program, the introduction of the AWACS, the tanker and the whole command and control network that goes with it. So the answer to that would be no. We would still proceed to withdraw the F111 in the time frame that we intend to now.

Senator FERGUSON—While we are monitoring the progress and making sure there is no slippage, at what stage do we reach the point of no return with our commitment to purchase the JSF? What year do we reach the point of no return?

Air Marshal Shepherd—I might ask Lieutenant General Hurley, Chief of the Capability Development Group, to talk about the government time lines and decision points.

Lt Gen. Hurley—You would be aware that we take the new air combat capability project to government for first pass in December this year and then for second pass in late 2008.

Senator FERGUSON—So that is the final point.

Lt Gen. Hurley—That is the call, so government is not saying, 'In 2006 we are going off to buy 100', or whatever. That call comes in 2008. That is nearly three years to look at the development of the program, to see how it is progressing, and to do our risk management approach to see what we are doing with the F18 fleet, the F111 fleet and the arrival of the F35.

Senator FERGUSON—The other question I wanted to ask is: one of the witnesses this morning said that there are a lot in the American air force who would sell their own grandmothers to lay their hands on more F22s than they are currently planning to get. If they are planning to use the Joint Strike Fighters—maybe using them for some different purposes to what we might be—if they are in line for the same aircraft, why is there such enthusiasm for the F22 amongst the Air Force? Is it because it is such a good aircraft for them to fly, and it can do lots of things currently, where the other one is still virtually in its foundation stages? I was surprised that some people said that that is how popular the F22 is amongst the Air Force—if the JSF is so good.

Air Marshal Shepherd—Certainly, the American air force—I cannot speak for them—

Senator FERGUSON—Obviously, there is general talk.

Air Marshal Shepherd—I am speaking from what I read on the public record as well, but it is my interpretation—I stress that it is only that. The American air force wanted more F22s. I think they originally wanted some 370-odd.

Lt Gen. Hurley—Some 750 originally.

Air Marshal Shepherd—It is important to realise that the American air force is very big, so they have overlapping capabilities. They do not have one capability to do one job; they have a range of overlapping capabilities, which is why they can withdraw platforms like they did with the F111 but cover that gap in their capability by using other overlapping capabilities. The Americans have a strategic situation that is not replicated in ours. It is a very good aeroplane. The Americans have an industry base that impacts on their decision-making process—it impacts on our decision-making process, as it should. Theirs is of a much larger quanta.

You heard from a previous submission—I was in the room—that the Americans will need to have a JSF. They will need to replace their F16 fleet, their A10 fleet—the fleet that will do that close air support and strike role. Their F15 fleet in years to come will also be obsolescent. It is

already an old aircraft design. They may want more F22s. They play their trade-offs between the capabilities they seek to get and the money they have along with their own legislative and political processes the way they play it. We do it our way. A lot of their outcomes and desires are possibly incidentally germane to us but maybe not directly. I stress again: our analysis and our assessment is that the JSF has the capability that we need. I am no expert on the American process. Dr Gumley has been across there far more times than I have. Steve, would you like to add anything to that?

Dr Gumley—I think you have covered it well.

Senator FERGUSON—Remembering when the decision was made, one of the overarching reasons behind the decision was that at that time we felt that it was the best value for money—in other words, for the amount of money that we were prepared to spend, the JSF was the best value for money although we were buying a bit of a pig in a poke at the time. I presume that it is the position of the Air Force and the Defence department that it is still the best value for money.

Air Marshal Shepherd—Clearly—and I made those remarks a number of times in my opening statement—we must look at a balanced Defence Force. We cannot buy an air defence force or an air superiority force at the expense of other aspects of a balanced Defence Force. Lieutenant General Hurley can give you percentages on what we are spending over the next 10 years in aviation type capabilities. Were we to spend more we would need far more substantial funding from government, which puts its own pressure on other government programs, or if we kept it within the Defence budget it would distort Defence's budget at some expense to land and maritime capabilities. We do not work up single service stovepipes. Force developing is done.

There sits Lieutenant General Hurley wearing a green uniform and he has become very knowledgeable on fighter affairs in recent times. He tells me he is the second best fighter pilot that never flew, and with some of his insightful questions that may well be the case. But we force develop and we look at a balanced capability across the ADF. It is still the best value for money. Were we to go to an interim fighter for some strange reason—and we do not expect that to happen—it would cost us more than the JSF, so it is still the best value for money, not just in a fifth generation sense but when comparing it against fourth generation contenders.

Mr CAMERON THOMPSON—One thing that intrigues me a bit about the whole of the JSF program is the different configurations—the different STOVAL versions and the carrier version. Seeing we are going for the conventional version, can I get some comment? Is the version that we are interested in prioritised? Within that program is it a No. 1 priority or are they all being marched together in parallel—in other words, is the danger of slippage in some way enhanced at all by the fact that we have to accommodate those other versions within the program?

Air Marshal Shepherd—I will ask Air Commodore Harvey to comment on the program; I will make an introductory comment. The conventional take-off and landing version is the version required for us. Once you go to a STOVL version or a carrier version, you are adding extra weight which comes with a penalty of fuel, weapons or uplift. There has been some public debate about a STOVL version. We need to provide a guaranteed close air support capability for Army. We believe we can best do that with a conventional version using tankers and the whole networked system of systems in that sense. It then allows the aeroplane to undertake a true multirole capability. Every time you put something around the edges, like the STOVL or the

carrier version, they become slightly less multirole. My view is that the conventional take-off and landing aeroplane is the prime aeroplane, with the others derivatives of that.

Air Cdre Harvey—As you say, the three variants of the aircraft are basically being progressed in parallel. One of the key points is that the avionic systems of the aircraft are 100 per cent common, so they all benefit from development of that. I recently attended the critical design review, which covered the conventional take-off and landing and the short take-off and vertical landing variants of the aircraft. The carrier variant is lagging about a year behind that. The key is that the conventional take-off and landing is seen as the core system. The STOVL is a more complex variant of that. They wanted to make sure that that was assessed first, because the technical developments of having that fifth generation stealthy platform that can take off from very short distances and land vertically were the more challenging, so that has been through the critical design review. But, in general, they are progressing together. The carrier variant, because it is required later in smaller numbers, will be the last to mature, but by far predominant in numbers is the conventional take-off and landing, and one of the reasons is that it is so much cheaper than the other variants as well.

Mr CAMERON THOMPSON—We have already heard reports that I think said that we are confident that we are going to be delivering according to the time frame. I wonder whether the process of having the three variants and working them together is in any way an impediment or an irritant to that process.

Air Cdre Harvey—One of the benefits of having three variants to the project is that, because the short take-off and vertical landing is so demanding in terms of weight, the work done to reduce the weight on that variant has flowed through to all the others. And, as I said, the avionic system, which is really the most complex part of the overall system, is 100 per cent common, so we all benefit from that. The engines are common. It has been seen as a benefit to do all three rather than just focus on one, and it gives you the maritime focus the US Navy has, the land focus the US Marine Corps has and also the air focus of the Air Force, so you get all three together.

Mr CAMERON THOMPSON—Something that came out of what you said, Air Marshal, about this head space and moving the personnel is the manning for the JSF. Are there any parts in that particular process of transferring one to the other where we come under critical manning pressure and where our numbers of pilots and support crew are going to be under pressure and the need for recruitment, or the need to retain people, is going to become very strong?

Air Marshal Shepherd—CDF and all the service chiefs are on record as saying that our strategic threat to the future is the ability to attract good young people into the services in the increasing ageing demographic of Australia. But if we solve that problem—and Air Force recruiting is going very well—then we do see the need to move from the F-111, as I said, to the upgraded Hornet and into the JSF. Obviously, it will not always be the same people—people will get posted and move around—but the block of F-111 people, those sorts of establishment numbers, would move into the JSF environment. Will it be one for one? No, it will not be. There will be savings made. There will be efficiencies. I will quote you some figures. They reckon you can change the hydraulic tail actuator in a JSF in under one minute. It takes six hours to do that in an F-111. The JSF has a large quantum of advantages in technical support, so we will not need as many people for the JSF in a support sense as we will with the F-111. It is going to be a new

aeroplane; you are not going to have to take it down to the garage as often. The F-111 is a very old aeroplane and requires a lot of intrusive and intensive servicing.

We are managing that plan. We have it broadly blocked out at the moment, and we are confident, at this stage, of its development, and there will be a lot more iterations to go in that. In fact, we are presenting to the defence capability later this year our first fairly locked-down F111 transition plan and the transition to JSF plan. There are two separate entities.

That is the broad head space that we need to have. We cannot just go out and recruit another 200 to 400 intelligently-trained pilots and maintainers from the street. It will take time to grow those people. That is part of our strategic workforce plan. We work singly within the services, but also as part of the Defence Personnel Executive, our overarching ADF workforce plan.

Knowing that that demographic threat of the future is always there—an ageing population, lots of jobs, low unemployment—there is always the requirement to be an attractive employer and the employer of choice for the young people. We believe we have got the building blocks in place and the broad plan is shaping up adequately at this stage.

Mr CAMERON THOMPSON—In that transition process, are there any points you could point to where the demand on numbers of people is going to be the highest?

Air Marshal Shepherd—Yes. We are already aware that we could well require more air crew. We are already looking at that in the context of not just the JSF but also the recent C17 decision—decisions that would flow on through our airlift fleet and decisions that come about as a result of our increased tempo of operations. The JSF cannot be seen in isolation as part of that. We have a number of people who actively plan workforce issues well into the future. I would hate to say that come December 2008 we are going to have a sort of nodal point. It is not going to be like that. But we are aware of the threats out there, and we hope we have got strategies in place.

ACTING CHAIR—Gentlemen, I would just make the observation that, as a platform, I am really fully network centred enabled. My situational awareness is that time is getting on. Thank you for these very detailed answers to questions on notice. I just want to ask a few questions that I have put in similar ways to previous witnesses—just for me to be able to get a bit of a handle on this. Then we will finish up before our situational awareness plummets for everyone.

I have not been privy to private briefings, so I have only picked up what I have picked up along the way. I have only been on this committee since last year. There are a couple of fundamentals that I still cannot work out: whether a government decision or a Defence determination drove this. There are two background questions here. One is a question of strategy and policy in two statements: in Defence 2000 and, Air Marshal, in your very first statement at the start of this. The gist of it was that the real challenges will be in north-east Asia and east Asia. We do not really see the close regional South Asia, and therefore our close region, being the fundamental problem. My guess is that the corollary of that, and the implication, is that the strike capacity that we had previously could be withdrawn, not just because of its age but because the theatre has changed in terms of that general strategic thing. At the annual report I got belted over the knuckles for an observation like that, because I think it was misinterpreted in

terms of what I was putting. Could you just explain a little bit more about that? It seems to be driving how we expect the new capabilities to operate.

Air Marshal Shepherd—I will pass to Mr Pezzullo in a second, to answer that policy and strategy statement, and I will pass to Lieutenant General Hurley, who will answer the specific question on government process and how the decision was made. I would just make the point that we never bought the F111 to attack China or Russia anyway. We bought the F111 in a regional context. We have never seen ourselves as being beyond that regional context with the F111.

One point I want to make about the F111 that has not come out is: whilst in the 1960s, when it was originally envisaged, it was going to be sent off alone to do its business. That is not the way we would operate with the F111, and we have not done for many years. So when you get to issues about the range of the JSF and the reach that we are able to project strike, were that unfortunately necessary, we are effectively constrained to the range of the F18 with the F111 now, because the F111 does not have situational awareness; it needs to be escorted by F18s. They need to be tanked, so we are in that situation and we have been for many years now. We do not send the F111s out there; it has not the survivability or the situational awareness to do that.

It is not as if we are withdrawing a capability that had the power to bomb Vladivostok, say, to replace it with something that is much shorter range. I will ask Mr Pezzullo to touch on the strategy and Lieutenant General Hurley to touch upon the government decision process.

Mr Pezzullo—As I heard your question, you asked whether there had been—as I interpret it; my apologies if I get this wrong—a significant shift in our strategic thinking or our assessment of the strategic environment such as would drive a different type of strike capability other than the one Australia has traditionally had for the best part of three decades. I think Chief of Air Force covered that. I would add this to his comments—it goes back to what I said earlier—in fact, I will take a step back and take the opportunity to make a broader statement that has got relevance to other Defence issues but foundationally it needs to be made because it is relevant to this issue as well.

I think there is a fair amount of uninformed debate, frankly, in the public arena about supposed ambiguity, nuance, slippages in strategic direction and the underpinning strategic basis that Defence planning is based upon. It seems to me that that confusion, such as it is, that ambiguity, such as it might be, is perhaps in the minds of the two dozen people who seem to obsess about this outside of what we do on a day-to-day basis. I need to say this pretty starkly—and I touched on this in my own remarks before—there is no confusion in terms of what I understand government to be telling me, which then frames the strategic task for the ADF that I try to articulate as best I can for General Hurley and his staff to then develop capability strategies and options to address those strategic tasks.

The air combat capability requirement set out by government—it is true to say that there are some classified documents that necessarily need to sit below this which are more precise as to geography, regions and distances, which I know you would not expect us to retail in public—is entirely congruent with the public language of the document. The white paper was published, as you well know, in 2000. The decision to enter in the JCF project and to change Air 6,000 into the

new air combat capability project was made in 2002 has been remarked upon several times, and that is the track that we are currently on.

There have been some questions and answers about the project previously. It suggests to me strongly when I back cast into the decision-making process—and General Hurley can give you the fine details if he wishes—that there was a pretty clear understanding in the mind of government about the strategic task for the ADF that they had set only two years previously, 24 months or thereabouts. They took advice, as is the process, from the Minister for Defence taking a submission to the cabinet—or to the National Security Committee more properly in this case—and they announced a decision. It is not as though on my reading of it, both at the classified level that I get access to as well as the public documents, that much changed in terms of the fundamental strategic task for the ADF in that 24-month period. In fact I would contend to you the opposite: the capability that the project is developing in terms of its stealthiness, its network capability, its size capability, its situational awareness capability et cetera is precisely the project that seems to meet all of the strategic tasks that, if you like, I am the steward or the guardian of that I derive from the white paper. I put the proposition almost the other way: if I were to press them for an alternative outside of this project, they struggle to give it to me in terms of the all round kind of capability that the strategic tasks require.

It is a bit like a cricket analogy: this is a very good all-rounder, a brilliant all-rounder, across all the strategic tasks, public and in more detailed terms classified, that we develop. In particular scenarios, platform on platform, that some people focus on to a very high degree, are individual platforms going to be a better opening batsman than the all-rounder? Quite possibly, that is the whole nature of being an all-rounder. Were we the United States Air Force and, as the Air Marshal indicated, where you can have a balance of capabilities that address many different contingency scenarios with many different platforms, we would be a different sort of air force if we were like that. We would, funnily enough, be something that looked like the United States Air Force.

That takes me back to the proposition that I put to the committee in my earlier remarks: if you look at the strategic underpinnings of the very substantial other submission that you have got before you, it deals with the strategic reality that is in the government guidance that we have. But also in terms of the most speculative parts of the crystal ball that I can see, it is one that we do not plan for—that is to say a fully networked air force attacking Australia where Australia had no access to the kind of network capabilities that we have been touching on, where Australia's alliance had completely disintegrated for political capability or whatever reasons is something that exists in a parallel universe. I do not mean to say that dismissively. There was a question asked by Mr Edwards before about people treating the gentlemen in question with some sort of antipathy. I would not know them if I fell over them in the street—I do not even know if they are in the room—but I am going off the strategic logic of what the contention is versus what government policy is.

ACTING CHAIR—The related 'dead cat' part of the process is Air 6000, which, as I understand it, was dramatically foreshortened by that decision in 2002—relatively unprecedented in terms of the normal process. After looking at all the options and all the rest of it, bang, it got foreshortened. I would suggest part of the process since that foreshortening has been the lack of detailed consideration, except in this ASPI paper, of why Defence says, 'All of the other ones,' like the Eurofighter, the Typhoon and so on, 'are not up to scratch.' That may

well be a significant part of the problem that people have in coming to terms with why there is the push for the JSF.

Lt Gen. Hurley—Mr Pezzullo laid down the time frame. We had the Defence 2000 white paper, and then in June 2002 we put in a submission to government regarding doing the SDD process for the JSFs, based on our understanding of the strategic and operational requirements, our strike capability, our understanding of the other competitors and what the SDD offered in our understanding of the capabilities designed for the JSF. The government accepted the recommendation to enter into the SDD phase and determined that, if it was going to invest in the SDD, it would probably be more inclined to purchase a JSF in the future; therefore, we should cease the Air 6000 competitive process because of the costs, essentially, that other people would incur when we had already made a decision, in part, to examine this aircraft in more detail.

I would say the process we have followed since making that SDD decision is to test the decision and not try to justify it. I think that is quite a clear distinction. Comments have been made that we are not doing a testing evaluation, but we have a significant team of people under Air Commodore Harvey who are working this problem hard here in Australia at DSTO and in the United States. We are not lying back waiting for America to tickle our stomach and tell us, 'Here's your aeroplane.' So we will work through that.

I also think people should not reinvent history. The Kinnaird model did not exist in 2002, and I know because I was the head of capability systems. What we have done is reframe this project into the Kinnaird model. So, by the time we get to first pass, we will have had 5½ years since that decision to look at the issue to take it to government. So have we foreshortened anything? We made a decision that this aircraft was what we wanted and we needed to pay some money to be in the game—because it had national benefits as well on benefits on the industry side of the house. We thought, 'Let's test that decision and come back and tell government it is the right way to go, and tell government in a time frame that allows us to respond accordingly if it is not the right answer.'

ACTING CHAIR—I have a question that I have put to other witnesses about the problems with the network—the fact that, if you have to push forward a fair way using this all-capable F35 in strike mode or whatever, the closer you get to going further out, the more vulnerable the whole operation becomes because the refuelling and other supports become much more vulnerable, particularly with the relatively cheap missiles that are available. The other part of this is the platform stuff. I was amazed to learn today that the F22 Raptor, which is not in service yet, is basically obsolescent. That may be news to the people who are going to fly them as well. If we had the dough, given that it is fully fifth generation and fully stealthy, would we be looking at incorporating that? It is clear as daylight to me that there are doubts about how stealthy it would be, about how long in the tooth it is, about the level of munitions and about it being a tier 2 and not a tier 1 aircraft. Given all the debate about the costs, if we had extra—beyond the $100 billion or so that we are looking at for the five squadrons of JSFs—would the Raptor add to our capacity in giving us extra reach or protection because of its very stealthy nature and the fact that there may be situations which arise where it might be tier 1? Biggles may not necessarily have had problems just in the Gobi Desert. But you can envisage situations where there will be close combat as lethal as CDF indicates that there will be in the future.

Air Marshal Shepherd—Let me address that in the main and I will ask other members to pipe up if I drop the ball. On the F22: there is no doubt that it will be the world's best air superiority fighter. If we were living in a hypothetical world and it was available, which it is not, and we could afford it, which we can but it would distort the budget, the F22 and the JSF would give us a better air superiority capability in the air-to-air role. There is no doubt about that. But at what cost? What cost to government in distorting other government programs, what cost to Defence in distorting our own capability budget and a balanced ADF, as I explained earlier, and also what cost to Air Force? In fact, the F22 is in operational service now in the US, and, interestingly, the ability to handle low observable technologies on a day-to-day maintenance basis is proving to be easier. That is better than was expected. But it still comes at a cost—of maintenance people, different aircrew et cetera. So it becomes a logistics, training and engineering cost to what is by world standards a moderate sized but First World capable air force. So there is that.

How much do you get for that extra cost? Well, you do not get a lot more. The JSF is very capable in the air-to-air environment. It is also truly multi-role. Putting aside the strike part of it, in just the air superiority and the air-to-air role, we believe it will still have a tier 1 v. tier 1 edge. If we were to look beyond our region—and, once again, the focus of our submission has been our region—then of course we would see ourselves playing a role as part of a larger coalition and we would package our forces. We would commit our forces along government guidelines at the time to achieve a political and strategic outcome, but we would package them in a technical and practical military sense to work well with those other forces.

That gets to the point of how vulnerable the whole package is when we push it forward. But I say again that we are already doing that. The F111 must be escorted by the Hornet now, so we are already in a situation where we have to push things like the tanker forward, and that is the old venerable 707. It will not be something as simple as having three JSFs detailed off to orbit around every AWACS aeroplane and every tanker; it is not that simple anymore. But in some ways it is a lot easier. If we have a fully networked system of systems, we will have knowledge dominance in the air battle space. We will know things about other people before they know things about us. We do not have to have flies buzzing around the honey pot—the honey pot being a high-value tanker or an AWACS in close proximity. We will be able to let the whole force range free with information sharing. The AWACS will be able to see things approach it before they can get to it. So it is not as simple as someone sending off a long-range missile that will sneak in through our defences. There will be an overarching network of knowledge that will allow us to know all. Then, of course, our aim would be to see first, shoot first, kill first.

So we would look at that in our doctrine and in our tactics. I know that Dr Stephens in his presentation mentioned how the Spanish air force were recasting their doctrine and tactics; we are very much looking at doing that now. We have already moved into that environment with our current level of networking. So I do not see any threat there, really; I just see a sensible adaptation of our doctrine and tactics. We would use the synergy that the network would give us to enable us to do that. We now also have long-range stand-off weapons. I hope that my fighter pilots of the future never get to see an enemy aeroplane unless it is in the data-linked image that is sent back from the long-range missile as it is about to hit one and blow it up. I hope they never get to see one with the naked eye, in the flesh.

ACTING CHAIR—Thank you to everyone for your assistance today. To all the Defence people, thanks very much for your time and effort here, and your attendance. If you have been asked to provide any additional material, could you please forward that to the secretary. Thank you.

Resolved (on motion by **Senator Ferguson**):

That this subcommittee authorises publication, including publication on the parliamentary database, of the transcript of the evidence given before it at public hearing this day.

Subcommittee adjourned at 1.25 pm