

Foreign Affairs, Defence and Trade Committee
Joint Strike Fighter Inquiry
Department of the Senate
PO Box 6100
Parliament House
Canberra ACT 2600

Chairman and Committee Members

The Planned Acquisition of the F-35A Joint Strike Fighter

Please find attached my submission to this Inquiry covering the aspect of its potential combat performance in the future against projected regional capabilities.

Regards

Michael Price

13 December 2015

Attachment: JSF Inquiry Submission

By email.

This is a follow on response to material presented to the last Parliamentary inquiry into the JSF and includes new detail on claims made by Lockheed Martin and the Department of Defence as well as matters not addressed by either party for their own reasons.

My background and knowledge in this matter is based on over 35 years in Defence and of those years 20 years as a Director with the last 8 years as the Director of Explosive Ordnance where I was responsible for the design, development and conduct of classified wargames, both contemporary and future, that incorporated seminar wargames, simulations and parametric analysis amongst the tools used; and I was also responsible for Joint Project 2085 - ADF War Stocks of Explosive Ordnance. I also did the analysis of the results of the Second Gulf War air campaign against the full range of targets assessed to understand and advise on Australia's emerging need for ordnance, having previously done detailed analysis on the Falklands War and the First Gulf War.

Finally, I did classified analysis and assessment of the JSF in possible future combat scenarios, based upon its original JORD specifications, not its now degraded reality.

The RAND Corporation, Project Air Force, does work sponsored by the senior leadership group of the United States Air Force (USAF). One project in 2008 was Air Combat Past, Present and Future which was produced by Dr John Stillion, a senior policy researcher for RAND. In developing his work Dr Stillion and Scott Perdue had contact with Air Power Australia (APA) because of its excellent knowledge and analysis of defence systems and capabilities, particularly Russian and Chinese systems, and the fact that Dr Carlo Kopp has done work for the USAF.

During the development and refinement of this project the question of game changing capabilities such as High Frequency (3Mhz to 30Mhz) Over the Horizon Radar (HF OTHR) were raised. Australia has a basic capability in the JORN system. More advanced systems such as interferometric capable HF OTHRs and high altitude unmanned aerial vehicles for China were being explored as part of a range of possible countermeasures to the development of USAF air platforms' stealth capabilities in the F-22 and F-35. Chinese HF radar signals have been detected as far west as Switzerland from a transmitter site north of Beijing, over 8,000kms.

Mr Chris Mills, a colleague, was also in contact with Dr Stillion during this activity and advised him that REPSIM was able to simulate integrated air defence systems incorporating HF OTHR and other systems such as VHF airborne radar due to our knowledge, experience and skill in military analysis, assessment and simulations in the Department Defence.

Harpoon 3 Professional, a constructive simulation now called H3MilSim, was used. It had produced excellent results over time, and had been modified and upgraded to improve its functionality by both government and large private companies that use it.

To illustrate how functional and accurate a simulation it is I can recount that Harpoon 3 Professional was used in blind trials I ran that were requested by General David Hurley to compare with highly classified (and expensive) simulations of known capabilities of sensors, weapons systems and combat systems used by allies against very lethal, advanced threat missile systems. We simulated both allied and adversary capabilities and the results of the blind trials, **and this excluded any access to secret**

data, relying upon the knowledge, experience and skill of my staff, were that our averaged results were within 2 percent of the classified work. Anything within 5 percent of a simulation outcome is generally as good as can be expected.

We developed a series of scenarios to map to part of Dr Stillion's presentation regarding possible future conflict with China. We simulated the F-22 and the F-35 with air to air refuelling (AAR) aircraft and airborne early warning and control (AEW&C) aircraft as well as other capabilities such as an aircraft carrier battle group (CVNCG) and land based defences against a Chinese force based on Su-35 aircraft with advanced missiles and relevant tactics against the US forces, supported by HF OTHR systems and other capabilities focused on potential combat around Taiwan.

We finalised this material in early August, 2008. Dr Stillion was impressed with the output we provided from the scenarios that included the data files and movies of the simulations running. Our purpose was to expand our client base and the RAND Corporation could have been a good customer. An interesting footnote is that RAND acquired Harpoon 3 Professional after we provided our material to Dr Stillion.

This material was used by Dr Stillion in briefings at the now infamous Pacific Vision 2008 activity in Hawaii. The briefings were coincident with the Pacific Vision War-game but were not part of the Pacific Vision War-game.

However, it was also used at a number of other previously unreported briefings including the apex of USAF air combat development and training, namely the Fighter Weapon School and the 57th Aggressor Group in Nevada. The 57th Aggressor Group fly aircraft to analyse their capabilities and assess tactics that can be used to defeat them as well as ways to defeat integrated air defence systems.

Dr Stillion reported shortly afterwards:

"We presented the air-to-air story to PACAF and 13th Air Force fighter experts (mostly weapons school grads) last Monday. They were all in total agreement and if anything believe things may be worse than I depict.

On Tuesday we presented it to Gen. Utterbeck (Commander 13th Air Force) and his staff. Same reaction.

Wednesday we flew to Las Vegas. Thursday we presented the air-to-air and airbase vulnerability story to about 50 fighter weapons school instructors and 57th Aggressor Group experts. Same reaction there as well.

Only meaningful feedback is that your radar range equation chart should be classified. I think this counts as due diligence on our part so next stop is ACC."
(ACC - Air Combat Command)

The material produced for this activity was reviewed and accepted by the best that the United States Air Force can produce, namely the Fighter Weapon School and the 57th Aggressor Group in Nevada, PACAF and the 13th Air Force where after being presented with the brief by RAND that incorporated the detailed analysis of APA and the REPSIM simulations their only issues were that the potential reality of air to air combat in which they could be involved may be worse than the brief and simulations predict and that the APA radar calculations are so accurate that they should be classified. Again so much for the oft touted claim of the ignorant and stupid that without access to "secret" data you cannot produce accurate material. What is unique is the REPSIM database that is used with Harpoon 3 Professional, it is not the

standard database provided by AGS. It has been modified and developed to meet very specific situations in simulations and nobody can access or replicate this database.

These USAF personnel have knowledge, skill and experience far surpassing that of any in the RAAF. The last combat air patrol related operation performed by RAAF fighter pilots prior to the ISIS deployment was to fly combat air patrols around the isolated island of Diego Garcia in the Indian Ocean against possible jihadist albatross or pelican attacks; and for which combat medals were awarded.

Following the leak and publication of the simulation results, the summary dismissal of Dr John Stillion, the leader of the RAND Project Air Force team responsible for this work and the departure of Scott Perdue, appears to be a low point in the management of the RAND Corporation from an ethical and self-interested point of view. It would appear to demonstrate craven cowardice in the face of pressure from the US DOD over the JSF analysis and reflects poorly on its reputation for objectivity and integrity.

To illustrate the blatant duplicitous nature of the RAND Corporation's senior management, read the following email from the Director of RAND Project Air Force after the leaking of the simulation results became public:

From: Hoehn, Andrew
Sent: Thursday, September 11, 2008 12:27 PM
To: Vick, Alan; Ochmanek, David; Cook, Cynthia; Moore, Richard M; Stevens, Donald
Cc: Stillion, John; Hagen, Jeff
Subject: RE: Someone leaked John's briefing at Hickam

Until this episode plays out, we need to keep our work within Air Force circles only. We should only go outside the Air Force with explicit permission from our sponsors.

Andy

and,

From: Vick, Alan
Sent: Thursday, September 11, 2008 12:00 PM
To: Ochmanek, David; Hoehn, Andrew; Cook, Cynthia; Moore, Richard M; Stevens, Donald
Cc: Stillion, John; Hagen, Jeff
Subject: Someone leaked John's briefing at Hickam

Andy, David, Cynthia, Rich, Don,

Got this email from Gary Liberson at LMCO. Apparently someone who participated in the game at Hickam leaked John's air-air briefing to the Australian press. (No accusations here, but FYI for those not at the game, there were RAAF personnel involved, including two on my red team.)

I'm still trying to track down the article.

There is no direct quote like that in John's briefing which does not specifically address F-35 shortfalls but rather is a broader treatment of air to air combat.

I'm working at home today.

Alan.

Now compare the above with the publically released statement of Andrew Hoehn of the 25th of September 2008, obviously drafted after some long and searing soul searching experiences, below:

[RAND](#) > [Press Room](#) > [News Releases](#) > [2008](#) >

Statement Regarding Media Coverage of F-35 Joint Strike Fighter

FOR RELEASE

Thursday
September 25, 2008

Andrew Hoehn, Director of [RAND Project Air Force](#), made the following statement today:

"Recently, articles have appeared in the Australian press with assertions regarding a war game in which analysts from the RAND Corporation were involved. Those reports are not accurate. RAND did not present any analysis at the war game relating to the performance of the F-35 Joint Strike Fighter, nor did the game attempt detailed adjudication of air-to-air combat. Neither the game nor the assessments by RAND in support of the game undertook any comparison of the fighting qualities of particular fighter aircraft."

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In an interesting quirk of fate the detailed reasons why the claimed simulation successes of the JSF in mission scenarios conducted by Lockheed Martin, the Project Office and other countries differ so markedly from the REPSIM constructive simulation work has finally been revealed, publicly, for the first time. It calls into question the veracity of much of the Defence and Lockheed Martin testimony to the Australian parliament in 2012 and earlier, regarding the status and value of JSF simulations and their outcomes.

In January, 2014 Dr J Michael Gilmore, Director of Operational Test and Evaluation (DOT&E) for US DoD programs stated that the JSF program is now at significant risk of failing to mature the Verification Simulation (VSim) and failing to adequately verify and validate that it will faithfully represent the performance of the F-35 in the mission scenarios for which the simulation is to be used for operational testing.

VSim is the main simulation built by Lockheed Martin and used by the JSF project to assess likely combat performance of the JSF against a **claimed** wide range of threats.

However, it is now apparent that "VSim may not adequately replicate the installed systems performance (i.e. the performance of all the F-35 systems and subsystems as installed in the aircraft) in the mission scenarios"

Also, there is a lack of validation for government furnished threat and weapons models that require significant additional validation after modifications made to them during integration into VSim. Then there is the lack of valid F-35 installed

performance in the VSim. Basically, what that means is that reductions in JSF capabilities and performance discovered during flight testing are not currently retrofitted to the VSim representation of the JSF in all its forms. In short, they can fly faster, turn quicker, have less drag and have better acceleration than any real F-35s.

And finally, there are shortfalls in the test resources needed to gather key elements of data required for validation of the VSim for initial operational testing and evaluation (IOT&E), in particular for electronic warfare performance in the presence of advanced threats. This is the disputed crux of claimed JSF combat superiority.

However, most important pronouncement was the December 2014 report on VSim by the Director of O T&E. “It confirmed that in 2014 a review of VSim eventually led *to cancellation of the contract verification portion of Block 2B VSim* planned usage. About one-third of the validation evidence for Block 2B VSim was reviewed by the developmental and operational test stakeholders before the contractual use of VSim for Block 2B was cancelled.

This review confirmed that additional time was needed before VSim V&V could *potentially* meet expectations. Collaborative replanning of Block 2B activities is not complete, but V&V reviews to support operational testing needs are now planned for early 2015, with accreditation of VSim for tactics development and other uses expected in October 2015.

The contractor has increased resources on VSim V&V teams, and the quality of the V&V products is increasing. However, the rate of completing validation points (a comparison of VSim model performance to aircraft hardware performance under similar test conditions using data from flight test, avionics test bed, or labs), has been much slower than planned. This makes completing the validation reports, which analyze the points with respect to intended use, at risk to support even the reduced accreditation requirements for Block 2B. Additional resources may be required to complete the significant task of validating the complex federation of models in VSim in time for Block 3F IOT&E.”

In summary, all the JSF project simulation results gathered over the last 10 years or so have no validity at all. They only represent parts of a virtual F-35 in a virtual world (Lockheed Martin land) where the laws of physics, advanced threats and systems are ignored and the virtual F-35 has capabilities that do not exist outside of the simulation.

Right now it is not only incomplete in terms of contemporary and future threats as well as models for the combat scenarios but also inaccurate for the JSF performance itself resulting in an application that is useless for its intended purpose.

All any country has gained from VSim is skill in playing a multi-player, interactive video game, albeit the world’s most expensive, but still nothing more. Extraordinary claims require extraordinary evidence, there you have it.

There are many ways in which simulations (and models) can be used to create false or misleading outcomes. Without knowledge and expertise most people do not know that they are being deceived. Similarly, using federated models in an overarching

simulation which is the hardest construction to get correct, it is possible to fool yourself into believing that the entire system works when it is fundamentally flawed.

Constructive simulations provide a range of outcomes depending upon what range of variables are used and how sophisticated the simulation engine design is, whilst a model only does one thing over and over - if it is good you get the same result over and over.

Some simulations lack the complexity to represent a modern battle space like EADSIM where you can disregard topography or long range tracking such as HF OTHR – the EADSIM simulation is true as far as it goes but it does not meet the reasonable or representative test (R&R test) of future air combat against a peer competitor. Or it can be executed to give the F-35 an edge, if your aircraft has limited weapons, speed, manoeuvrability or excessive fuel consumption, then when you have fired your weapons the simulation ends thus relieving the F-35 of trying to evade enemy aircraft that have more weapons, speed and endurance that will run you down and destroy you. That simulation is true as far as it goes, but it too fails the R&R test.

Or, if you stage a simulation with starting parameters of say co-altitude, co-speed and head-on aspect you get a totally different outcome to one with an altitude separation of 15kft (JSF at 40kft and Su-35 at 55kft) speed differential of Mach 0.5 (JSF at Mach 1.3 and Su-35 at Mach 1.8) and vector angle of 45° (JSF at 0° and Su-35 at 45° to the JSF) both simulations are true but only one meets the R&R test. Similarly, if you simulate a JSF directed energy weapon at @ 1.494 GHz against aircraft and weapons without allowing for at least three classes of effective defences you only fool yourself.

However, the two most insidious fudges of all are the simulation setting that has a weapon hit equals an aircraft kill and employing currently useless variables for deciding outcomes.

Against small aircraft like the F-16 Falcon or Hawk 200 it might be probable that large active radar missiles like the Meteor, AIM-120, PL-12 or R-77 will get a kill most of the time, but with the development of towed active radar decoys for aircraft and more sophisticated electronic warfare techniques it is now much more problematic. Against larger modern fighter aircraft a single hit will not necessarily achieve a kill even 50% of the time. But when it comes to small missiles like the ASRAAM or AIM-9X against a Su-30 / 35 size aircraft with titanium fuselage components and engine cowlings (armour plate) then it is more likely than not that a hit may not even achieve a mission kill. False expectations kill.

In modern, highly automated air to air warfare where theatre assets, on-board computers and automatic defensive systems provide a level of support superior to any individual training outcome, the reliance on simulation variables for training, skill and morale with their subjective values to differentiate part of a beyond visual range (BVR) engagement outcome is verging on fraudulent.

Additionally, when you move to war modes then small changes can have a dramatic effect. As an example, in the 1967 6-Day War, Israel modified some of their A4-E Skyhawks with a one metre extension to its exhaust system to reduce the damage from the SA-7 infra-red heat seeking missiles. Moving the heat exit source further back reduced the damage to the airframe when a missile hit the rear of the aircraft.

The REPSIM simulations allow for all of these variables and more but, does not include meaningless variables for training, skill or morale. This is where part of the technical difference in simulation outcomes between REPSIM and Defence derives from. For instance, we designed a module for Harpoon 3 Professional to simulate damage mapping from successful weapon hits that incorporates all the necessary vector data to create models for detailed aircraft damage analysis. We also developed a module that allowed for a full hemisphere representation of entities such as an F-35 in the visual, infra-red and radar spectrums so that in the simulations the sensors of threat platforms and weapons simulate the appropriate value for that vector to the F-35, not just a one value for all vectors approach. The JSF has a huge differential in infra-red values for the side of the aircraft compared to the rear, and it is also true for the visible and radar cross section values for different vectors to the aircraft. We simulate tactically valid combat options in designing the configurations of adversary aircraft such as the mix of missile seekers (radar, infra-red or x-band seeker), salvo type (radar followed by infra-red or ESM) salvo timing (5 sec / 10sec splits) and lofted fly out profiles for missiles like the PL-12 or R-77 that can use higher altitude sensor viewings, up to 15kft above an F-35, before beginning their terminal attack approach, thus allowing the missile seeker close to a planar view of the F-35, rather than a nose-on aspect that maximises the F-35's X-band radar stealth design.

However, the crux of the RAND scenario and the simulations we produced was to explore the greatest paradigm shift for US airpower since WWII, which is that it can no longer rely upon absolute numerical or technological superiority in aircraft to win in air combat against a peer competitor. The potential of a modern Chinese integrated air defence system with HF radars providing initial input for Chinese combat aircraft of equal or superior numbers in tactical employments to locate and engage not only the F-22 and F-35 aircraft but also the supporting assets such as AEW&C and AAR planes is challenging. The laws of physics do not care whether you think you are the good guy or the bad guy. The numbers are the numbers. If you lose air superiority in the South China Seas but the other guy suffers more aircraft damaged it does not matter – you still lost.

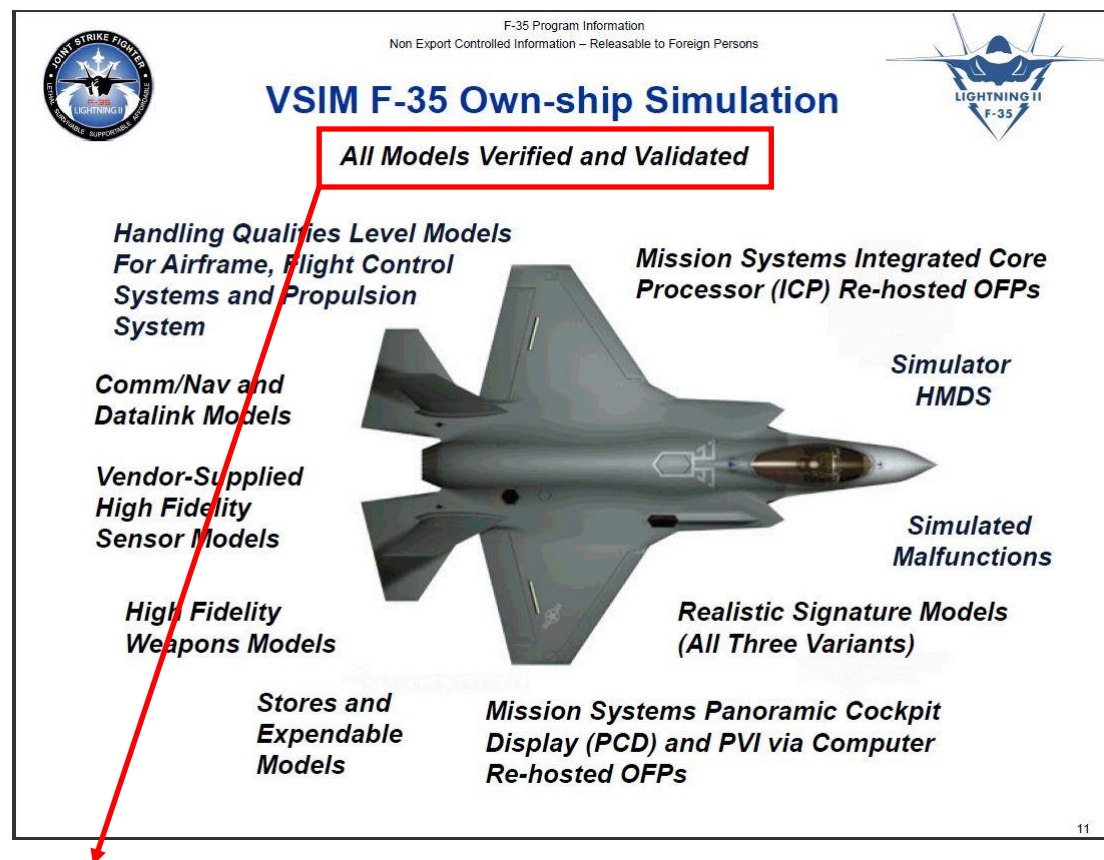
Similarly, there are other crucial areas for simulation such as the unpredictable and catastrophic failure of the frequency selective surface covering the JSF radar when a directed energy weapon is used. This does not appear to be adequately simulated with its now exposed radar a clearly radiating point source and a large reflecting target to adversary aircraft radars and missile radars alike.

All other modern fighter aircraft are capable of operating either alone or in packages at effective stand-off ranges (40kms to 50kms and altitude differentials of 10k to 20k feet) against the JSF and maintaining that engagement zone boundary to the JSF such that the JSF is the proverbial 'sitting duck' in a 3D barrel with not enough speed to engage or disengage, nor enough altitude to attain tactical combat superiority.

The JSF was not designed to be, nor will ever be, a capable all-rounder – it is an unsuitable platform to prosecute air to air superiority over any peer competitor, now and into the foreseeable future.

The only thing that has changed since we designed and built those simulations is that the real performance of the JSF has deteriorated relative to its JORD specification, and when these reduced parameters are used the JSF results also deteriorate.

However, if you read material released by Lockheed Martin Aeronautics on Modelling and Simulation Applied in the F-35 Program by Barry Evans of Lockheed Martin Aeronautics (Copyright 2011 Lockheed Martin Corporation) you get a diametrically different view:



That does not seem to equal the DOT&E detailed report to the US Congress in 2014/2015

Further, the Australian Department of Defence in testimony to the Parliament of Australia in 2012 stated the following in response to questions on simulations:

" 2010-11 Defence Annual Report Hearing – 16 March 2012

Q24: Joint Strike Fighter – Simulations QN12-000392

Dr Jensen asked on 16 March 2012 (Proof Hansard pg 54):

- (a) Have you done simulations against the Su-35 with different varieties of mixed missile load-outs against the F-35?

Response:

- (a) The New Air Combat Capability Integrated Project Team has performed simulations against advanced threats equipped with advanced weapons.
- (b) The Defence Science & Technology's (DSTO) Aerospace Operations Division (AOD) adopts an analysis approach that integrates a number of tools from several sources that together aggregate the best available knowledge. The following is a description of the analysis approach adopted:

- i. Seminar wargames experiments, including Joint Military Appreciation Process (JMAP) are conducted to provide insights into courses of action, likely factors of interest, the tactical employment options and the order of battle possibilities and permutations. These activities set the context and ensure the relevance of subsequent analysis. These wargames are often supported with data from models that address high level metrics to allow informed decision making by participants who will include representatives of all three services and civilian counterparts from other agencies.
- ii. Constructive simulation at the campaign / mission level is used to examine a large set of potential vignettes resulting from the first step. These simulations address both air-to-air and air-to-surface vignettes from differing scenarios and represent in detail the characteristics of the physical aircraft sub-systems and the tactics that govern their employment. Experts from across Defence provide specific subject matter expertise to develop, verify and validate these models.
- iii. ***Human-in-the-loop simulation has been used to provide a realistic tactical environment that allows pilots to experience the aircraft capabilities, to provide feedback on the performance of particular systems and tactics and contribute to the validation and verification of the underlying models. A regular series of these exercises has been conducted with the support of DSTO since 2003.***
- iv. ***Constructive simulation at a more detailed level is employed to examine the complexities of engagement level tactics and system-on-system interactions. This has included air-to-air and air-to-surface weapons effectiveness, interactions with electronic warfare (EW) systems, aero performance and simulations of individual sensors.***
- v. Engineering level simulation has been performed on specific sub-systems allowing for technical assessments and detailed understanding of sub-system design and performance.
- vi. ***Hardware-in-the-loop and/or mission-system-software-in-the-loop simulation has been conducted to provide the highest levels of fidelity. (Do you really think so?)***

It is important to note that there is significant interaction between these levels. For example: constructive engagement level results may be fed input into mission/campaign level modelling and analysis."

Defence does not say that VSIM and some of its models are incomplete and some models are inaccurate and that it is currently also useless for its intended purpose. Similarly, Defence also does not say that there shortfalls in the test resources needed to gather key elements of data required for validation of the VSim for initial operational testing and evaluation (IOT&E), in particular for electronic warfare performance in the presence of advanced threats which is the essence of the fifth generation myth.

Somehow, I think that was crucial information for the Parliament of Australia.

Or, Lockheed Martin testimony to the Australian Parliament Tuesday, 20 March 2012 to the Joint Foreign Affairs, Defence and Trade Committee (Page 6):

"....Typhoons that were Winchesters and were running from the Sukhois were about to get shot down by the Sukhois chasing.

Mr Burbage: We do not do those kinds of simulations. That is not the way we do simulations—we do not give one side an advantage or a disadvantage; we put the real data from the airplanes in the simulation and they run up many, many runs to get the numbers we are talking about. *Not according to the DOT&E report of 2013 “VSim may not adequately replicate the installed system performance (i.e. the performance of all F-35 systems and sub-systems as installed in the aircraft)” Page 44.*

Mr Liberson: And it is very important to note that our constructed simulations that Mr Burbage talks about without the pilot in the loop are the lowest number that we . talk about—the greater than six to one. When we include the pilot in the loop activities, they even do better when we include all of that in our partner—...."

That does not seem to equal what the DOT&E report on page 44 states "At the beginning of 2013, the Program Office had accredited 7 of the 25 models and simulations currently planned to support verification of the F-35. No additional models and simulations planned to support verification of F-35 requirements were accredited in 2013; so, the total number of accredited remains seven." So you only have 28% of the validated models needed for the outcomes of the simulations today.

It must have conveniently slipped the minds of the Lockheed Martin personnel to tell the Australian Parliament about the real status of VSIM and its models.

Similarly, Defence personnel did not correct the situation for Parliament either – was there a conspiracy to mislead the Parliament?

The reason why this is so important is that there is no other contractually mandated means of establishing whether the JSF will meet its own-ship performance goals and, more importantly, whether it will meet its combat effectiveness objectives, particularly against advanced aircraft and threats.

How smart is it to have Lockheed Martin build the JSF and also build the VSim that is supposed to validate that it will faithfully represent the performance of the F-35 in the mission scenarios for which the simulation is to be used for operational testing?

VSim output has the same value as Space Invaders, no disrespect to Space Invaders, for strategic capability assessments on the likely combat performance of the F-35.

Should anyone think this was the last time Lockheed Martin may have misled about this matter then you are wrong. The Chief Executive Officer and President of Lockheed Martin wrote to the Australian Parliament on the 16th of April 2013 responding to questions put by the Parliament to Lockheed Martin and stated “It was then and is now our intent to provide the Committee any information you may require regarding the F-35 Joint Strike Fighter program. We have reviewed your letter and the referenced materials including Mr Burbage’s testimony in March 2012, his subsequent February 2013 letter as well as those portions of the December 2012 report by the US Department of Defence Director of Operational Test and

Evaluation (DOT&E report) that are related to the F-35 Joint Strike Fighter. ***Based on this review, we believe that Mr Burbage's statements were accurate in all material aspects.*** Provably not true, yet again after over 12 months of review – this is not a heat of the moment response and never was – it was about concealing the truth.

Quotable quotes by people who actually know what they are talking about also seem to support the views of the RAND analysts, the USAF Fighter Weapon School, 13th Air Force, the 57th Aggressor Group, PACAF, REPSIM and Air Power Australia –

"If I do not keep that F-22 fleet viable, the F-35 fleet frankly will be irrelevant. The F-35 is not built as an air superiority platform. It needs the F-22,"

Chief of U.S. Air Force Air Combat Command General Hostage to Air Force Times, February 2014.

"I'm going to have some F-35s doing air superiority, some doing those early phases of persistent attack, opening the holes, and again, the F-35 is not compelling unless it's there in numbers," the general says. "Because it can't turn and run away, it's got to have support from other F-35s. So I'm going to need eight F-35s to go after a target that I might only need two (F-22) Raptors to go after. But the F-35s can be equally or more effective against that site than the Raptor can because of the synergistic effects of the platform."

Chief of U.S. Air Force Air Combat Command General Hostage Reported by Aviation Week (ARES) 06 June 2014

"Quantity is a factor," says Carlisle. "You may have incredible capability, but you can only be so many places at once. You have to man combat air patrols in the South China Sea scenarios. As we're moving into the fifth-generation aircraft, we are doing an assessment of the number of fighters we need."

Then there is the conundrum of determining how capable a Block 1 or 2 F-35 is against sophisticated enemy air defenses.

"Software is a huge challenge" to provide the needed Block 3 upgrade, says Carlisle. "We're not making progress as fast as we would like. We're redoubling our efforts to get better at it. [Not having the upgrades] means less capability. Could you employ it against a very capable anti-access, aerial-denial threat? Probably not."

Lt. Gen. Herbert Carlisle, U.S. Air Force Deputy Chief of Staff for Operations, Plans and Requirements reported in Aviation Week 08 March 2012. (He also decided to extend and upgrade the F-15s and F-16s that the JSF was to replace.)

The JSF has advanced technology, no doubt about that, **but** and the big but is, that it does not make it automatically an acceptable, let alone superior, combat capability, particularly against the advanced emerging threats we simulated, with more to come.

Making multibillion dollar decisions on the basis of video game grade material, analysis and assessment produced by the seller of the aircraft is not really a first world rated process - it is more akin to the "cargo cult" mentality of the third world. So much for Australia being an informed buyer; noting that up until General Bogdan took over the JSF project most critical information in the project was marked "US only". Sharing key data with partners was very limited. (Monday, March 18, 2013 statement)

The Australian government might be called reckless and stupid if they have committed to the JSF project in full knowledge of all this information, especially if you can pay much less for better combat capability. The government has adopted a buy before you fly approach rather than a fly before you buy one which is prudent procurement practice when reservations about capabilities have been raised by some of the best experts available, especially if our budget is tight now, and into the future.

In the information technology world they call this the marketing of “vapourware” – you never can actually get your hands on the capability and functionality promised by the salesperson. The Department of Defence has had massively bad experiences with these types of situations before – the first combat system for the Collins Class submarines where iteration after iteration failed to deliver until the Department and Government had to admit complete failure and go and purchase a US DoD solution. So much for Lessons Learnt, and becoming a better, smarter buyer and obviously no useful help from DSTO regarding the veracity of the VSim that can only be attributable to ignorance, stupidity or corruption.

The growth in the Defence budget for operating costs of the F-35 will be enormous, given that most of the higher level support will not be done by Defence but by Lockheed Martin or other suppliers at exorbitant rates. The compound effect of increased demand for RAAF funding will not only hurt taxpayers but it will also constrain other defence capabilities, so not only will we end up with a liability but we will have a more unbalanced force structure with which to respond to new challenges.

A simple illustration of the dynamic changes now occurring in our region is the growth of the Indonesian economy that will soon overtake Australia's in gross terms and its rapid acquisition of capabilities, both civilian and military that will provide it with air and naval superiority over the ADF. For example, the Indonesian Navy now has Russian long range, supersonic anti-ship missiles that the RAN cannot defeat because the launch can occur outside of the detection range of the Navy's organic sensors and the missile travels too fast for reliable and accurate missile defence. The JSF lacks the range, speed and endurance to be able to provide effective sustained combat air patrols against a high risk maritime threat much beyond the Tiwi Islands.

The Indonesian Air Force is developing and expanding with a force based around the Russian Su-30 series aircraft and potentially the Su-35 aircraft that have substantial capabilities, and in group air combat engagements are more than a match for a force of F-35As because of their two person team of pilot and weapon system operator who can use not only his own aircraft's sensors but also the networked inputs of other aircraft in the combat patrol group. Basically, these aircraft have a mini-AWACS capability that the US is only now trying to match with the F-35. The Russians have had a fielded advantage for 20 years in coordinated in-flight air combat interdiction and prosecution.

This networked sensor field reduces the F-35's stealth advantage particularly because of the Su-30 /35's multiple sensors for surveillance in many modes, radar, infra-red and electronic support measures that can detect the F-35 communications network. They also have speed, altitude, range, endurance, missile and weapons loadout advantages.

These capabilities when combined with the new Indonesian surveillance capabilities, especially their distributed, relocatable, long range, 3-dimensional passive location

systems provides the basis of a redundant, modern and effective integrated air defence system that will not be defeated lightly, should the need arise. Indonesia has made a generational jump in capability and capacity since the debacle of East Timor and their extreme determination that the United States of America and Australia will never again be in a position to intimidate and humiliate Indonesia, particularly its military, on the world stage and damage their national pride and international standing.

And, as sure as God made little green apples, Indonesia will exercise its superiority at some future time against Australia when it suits their national and international strategic aims. East Timor is a generational stain on the Indonesian psyche, and no sweet words from anybody will erase that stain. Without the likes of George W. Bush, no President of the United States is going to embark upon any armed response against the world's largest Muslim nation in defence of Australia's pride or interests given the new world geopolitical constructions. Those days are now long gone, short of madness.

Australia's military capability and capacity have declined absolutely and relatively to every major regional power since our hey-days of the early 1970s when we had capability superiority and an effective, balanced force structure sufficient to fight and win on its own terms. We have declined to the point where our once vaunted control of the maritime and air approaches to Australia is no longer a given.

If this government was not aware of all this information then the government has a much bigger problem. Once upon a time Defence was structured to conduct robust internal analysis and assessment on the basis that such abilities were not available in other government departments. The Force Development and Analysis (FDA) division, of which I was a Director, was effective for a considerable period of time in curbing the enthusiasms of ADF personnel for the next bright toy. Today, Defence lacks any competent adult supervision of capability ambitions and the results are now clear to see.

If the government thinks buying the JSF is like an insurance policy premium for the protection of the US nuclear umbrella then they better think that again, that policy expired in the 1990s. In our region, only one country that has nuclear weapon capability does not possess the means to readily retaliate against the USA should it threaten or employ nuclear weapons against them. This is not always the mutually assured destruction (MAD) strategy of the Cold War but a US President would not use the threat of nuclear weapons, or indeed actually use them, in defence of Australian interests or Australia if that meant that California was going to vanish from the face of the earth. The president is the president of the United States of America, not Australia.

Australia has to be responsible for Australia, and potentially burdening us with an unsuitable and ineffective capability that will limit the development of a more effective overall force structure is not the smartest national strategy in the play book.

There have been many critics of this material presented to the Parliament and on the ABC Four Corners program. It should be noted that the ABC staff did its due diligence prior to filming the simulation we presented. Much has been made of a claim that RAND distanced itself from this activity; RAND told the truth, just not all of the truth, and we have shown part of it here.

The reason behind why REPSIM has been attacked by so many involved with the JSF project is that its potential performance limitations in future air combat may render it a liability rather than an asset. Vast amounts of money and reputations are at stake.

Unvarnished assessments by real experts, free of political direction or intervention, are rare and should not be lightly disregarded. It should also be noted that the USAF has, subsequent to the work done by RAND in 2008, entered into contracts to extend the service life and upgrade the capabilities of the F-15s and F-16s, particularly radars, on-board computers and tactical displays. They aircraft were to be replaced by the JSF. This risk mitigation shows USAF prudence and insight into the evolving strategic calculus of capability development and innovative tactical developments.

This is particularly important for any country planning to rely solely on the JSF such as Australia, Norway, the Netherlands, Italy, Turkey, or Canada that unlike the USA which has many layers of capability ranging from nuclear and conventional missiles to F-22s through to F-15s and so on but when you consider that the RAAF might have to commit ten percent of its entire F-35 fleet every time to attack a single target then Australia is not likely to prevail against many a potential adversary beyond Papua New Guinea, Fiji or possibly, New Zealand.

And now that preliminary analysis of the Chinese J-20 and J-31 has been undertaken that outlook for the JSF is even more parlous. With the initial production engines quoted for the aircraft they are superior to the JSF throughout the flight envelope and with advantages in altitude and speed. However, when, not if, the J-20 and J-31 are fitted with 40,000lb thrust class engines then the real potential of these aircraft can be seen with the J-31 potentially being capable of supercruising at @ Mach 2.0 at 50,000 ft. The JSF can just do Mach 1.6 on afterburner at 40,000 ft. The J-31 may also best the F-22 maximum supercruise of Mach 1.73 by a militarily useful margin.

There are superior solutions to meet the needs of Australia, not the needs of the RAAF, and they are also affordable. Defence cannot claim they were unaware of this, however my personal experience of the vast majority of military officers is that they are educated but not intelligent and this applies to other countries as well. When faced with unpalatable information they rely on the five commandments encapsulated as I SAID which stands for Ignorance, Stupidity, Arrogance, Incompetence and Denial. They cannot concurrently hold two or three conflicting propositions in their minds and progress an effort to resolve the matter. Ambiguity is incompatible with their work mindset. They simply choose an outcome and do all in their power to achieve it. It does not matter if it is right or wrong – they will get posted in two or three years and nobody ever gets held accountable – they protect their own, as was demonstrated in the Defence Abuse Inquiry. It is in the nature of their culture.

Australia is already saddled with one non-effective combat lemon in the F/A 18 Hornet and Super Hornet aircraft which are two of only a few aircraft in the world that are inferior to the JSF. They cannot carry an effective strike load of heavy bombs – like the GBU-28 which is required to destroy some major targets and they cannot fly fast enough or high enough to out run or out manoeuvre potential adversaries like the Su-30. Air to ground missiles that the Super Hornet can launch are ineffective against hardened ground targets as was learnt from the Second Gulf War strike analysis conducted by the Allies. The AGM-142 was acceptable as a two tap capability but due to the stupid RAAF proposition, agreed to by a stupid government, to trash the F-111 capability Australia has lost its only effective airborne strike capability.

I reiterate that the simulation approach and outcomes are not merely a critical component of any sane contract on the JSF but, if it is flawed then not only will the treasure and good lives of people of many countries be squandered when reality bites against the first peer competitor to the JSF but the “domino” effect of proven air combat inferiority will impact not only on the losers but it will hearten the victor and possibly embolden them and similar adversaries to be confident that they can gain air superiority over a large chunk of NATO as well as other lemmings, Australia included.

In summary, the projected air to air combat outcome of the JSF against any peer competitor with modern aircraft and weapons can be succinctly encapsulated into the simple phrase “a coffin looking for a grave.”

The questions that now arise in the minds of any reasonable people will be where is the boundary of incompetence, stupidity, fraud and corruption? Who profited from this misfeasance? And more importantly, what will now be done to those people responsible? And where does Australia now stand?