AUSTRALIAN DEFENSE MODERNIZATION

Shaping Capabilities for 21st Century Operations

AUSTRALIAN DEFENSE MODERNIZATION: SHAPING CAPABILITIES FOR 21ST CENTURY OPERATIONS

Australia Shapes Its Air Power Approach for the 21st Century

By Robbin Laird

In my recent visit to Australia, I had a chance to visit the new tanker (KC-30A) and new airborne "AWACS" system (Wedgetail), the hypersonics development center and to participate in an RAAF sponsored conference on the impact of the F-35 on the evolving Aussie air combat approach.

What clearly came through is that Australia is building out a modest but effective 21st century Air Force built around the best available 21st century platforms and technologies. And in a discussion with a senior Canadian Air Force officer attending the RAAF air power conference, the point was made that "Australia is very relevant to our thinking about the future."

Australia had not bought new equipment for a long period but with the East Timor and Afghan experiences under their belt, they are building out capability to deal with the challenges in the neighborhood. And they are not going in for the low end; they are shaping a multi-function, multi-mission force able to work with key allies in the region and to support their joint force able to operate a greater distance, for more sustainable operations.

First up was the acquisition of their six C-17s. The C-17 helped launch the re-set of the Aussie Air Force by providing reach, range, and capability, which the RAAF had never had before. And underlying the C-17 acquisition is participation in a global sustainment program, which enhances the ability of the aircraft to operate globally.

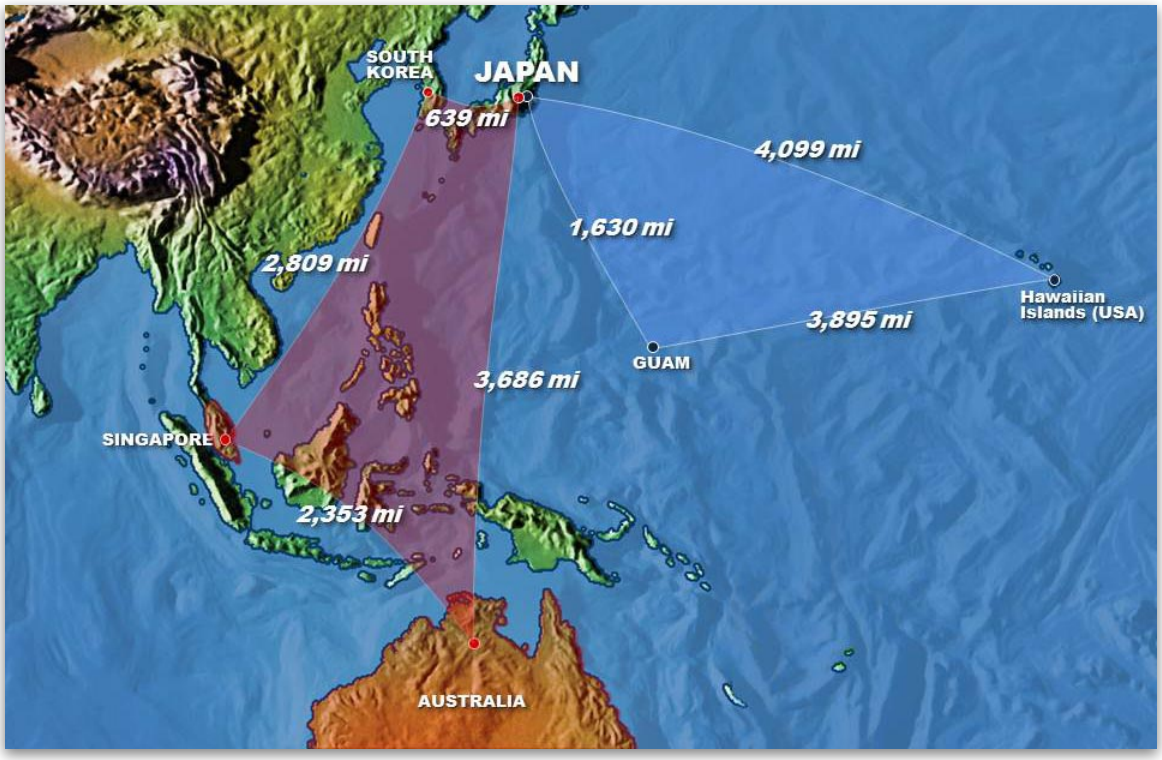
In an interview with the PACAF staff in Honolulu prior to coming to Australia, Jim Silva, a senior logistician with the Air Force highlighted the nature of this global sustainment program:

With our global sustainment program, if one of our C-17's breaks in Australia, they have C-17 parts. We don't even have to negotiate anything because there is pre-set agreement that we just trade parts. All of their parts are certified and can be used on any C-17 aircraft around the world. So we can go take an Aussie part and put it on an Air Force airplane, and vice versa; they can even use a U.S. Air Force part if one of their jets lands here in Hickam. The system is managed across the enterprise.

http://www.sldinfo.com/shaping-a-21st-century-pacaf-logistics-approach/

An important addition to shaping the reach, range and sustainability of the RAAF is the coming of the Airbus Military MRTT tanker to the fleet. The fleet of 5 aircraft will be fully operational by 2015 and will be joined in the region by 6 Singapore Airbus tankers as well and the Aussies clearly intend to work closely with Singapore to build out a regional collaborative fleet.

Two of the five planes were at Amberly during the visit. Three of the Aussie five tanker aircraft are currently involved in maintenance, upgrade, testing, and residual acquisition activities in Madrid and Australia. The squadron fleet should be at full strength in 2015.



Pacific Defense or Deterrence in Depth is a Key Australian and Allied Challenge. One way to look at the challenge is the intersection of two operational geographies; the first a strategic triangle within which the US generates forces relevant to Pacific Defense and the strategic quadrangle within which Australia works along with other key Aussie allies. Credit: Second Line of Defense and see Rebuilding American Military Power in the Pacific: A 21st Century Strategy (Praeger Publishers, 2013).

Last year, in combination with the C-17, the KC-30A squadron supported several F-18 deployments to Guam and to Darwin and Tindal, which demonstrated the ability to move an air wing and support it at extended range with tanker and lift support. This year the squadron has supported movement of Aussie F-18s from the United States across the Pacific and back to Australia.

Both operations underscore capabilities, which are part of shaping a 21st century Australian force for Pacific defense.

From discussions at the base and in Canberra, it is clear that the squadron is a work in progress but represents a significant boost in capability for the RAAF. And the *growthability* of the tanker is a clear advantage as seen by senior RAAF officers. Standing up the squadron, finishing the procurement and getting initial use of the tanker underway is a prelude for what comes next – adding capabilities to the tanker itself, working through the best ways to use the tanker with the RAAF force and to work out its interoperable role in the region and beyond.

The squadron has begun operations and support to the RAAF but is still part of the effort to finish the acquisition process for the tanker itself. The RAAF has really the first operational squadron of MRTT tankers and as the launch customer is working through the launch point for the foundational capabilities of the tanker.

There have been problems with the boom on the tanker, but according to the head of the MRTT program in the Australian MOD, the boom problem is well on the way to being resolved.

According to Air Vice-Marshal (AVM) *Chris Deeble*, "We expect the boom to be to complete testing and undergo acceptance around third quarter of 2014."

He indicated that the MRTT boom is a very advanced system, which provides significantly more capability than existing boom systems. He has been working on the program for some time and commented that challenges with the boom have been both software and hardware.

"There are elements of the hardware which have posed problems aerodynamically; and the integration of the software and hardware to ensure the required operating envelope have taken some time to develop. We are conducting the final Developmental and Qualification Test and Evaluation should be complete by mid 2014. We are focused on providing the RAAF with a firm basis for growing the Boom capability by the end of 2014. Working collaboratively with Airbus Defense Systems through these final phases of the program will be key to delivering a world class tanker capability to the RAAF."

Clearly, the Singapore decision validates the position taken by the Aussie RAAF officer. Indeed, AVM Deeble indicated that supporting Singapore during their acquisition program will remain a priority for RAAF and will ensure an interoperable regional MRTT capability.

The next major capability, which has been added, is the first software upgradeable aircraft (with the F-35 to follow) to provide for airborne battle management. The Aussies have purchased six 'Wedgetail' airborne early warning & control (AEW&C) aircraft from Boeing (built around the 737 airframe) with the revolutionary Multi-Role Electronically Scanned Array or MESA MESA radar from Northrop Grumman Electronic Systems inside (sort of like Intel inside).

I had a chance to visit the Wedgetail squadron at the Williamtown, RAAF base on March 6, 2014 and was the beneficiary of a round table with several members of the squadron during the visit as well as visiting the aircraft.

It is clear that the squadron, which has a distinguished combat record, is approaching the aircraft with a sense of enthusiasm, adventure and willingness to explore new ways it might be used. The backgrounds of the squadron are diverse with navy and air force operators mixed in, and with a wide range of experience in airborne surveillance and battle management, including several years of operational experience with the RAF on the AWACS.

The Aussies are in a rather odd situation whereby they are at the leading edge of 21st century changes, coupled with working with the USAF main contribution to this effort, the F-22.

According to the Squadron Commander, the system is "on the books" and ready to go to serve Australian needs and to contribute to coalition defense.

The Squadron Commander highlighted that the message going forward with the squadron was three fold: grow, integrate and prepare. Growth meant simply to fill out the squadron and enhance its operational capabilities. Integrate meant to build the squadron's ability to work within the battlespace, to work effectively with the other Aussie forces and with coalition partners. Prepare for the system will always be evolving.

The always evolving part of it is not widely appreciated. This is a software upgradeable aircraft with a defined launch point (IOC) but no fixed end point (FOC). The system will always be evolving and growing as the software code gets rewritten to reflect events and demands from the squadron (again similar to the F-35).

The squadron works through its experience and shapes change orders which get sent to the procurement authorities to sort out priorities for the next round of upgrading the aircraft.

The difference between older and such a new system was outlined by one participant in the roundtable as follows: "We have in the same time frame bought a CRC system full up which will look pretty much like it is in 20 years; with Wedgetail it will look nothing like it does now in 20 years."

And make no mistake: this is not simply a new form of AWACS. The AWACS is pushing the upper limit of what it can do. The MESA radar on the Wedgetail is a whole other animal, able to reshape what a battle management radar can do over time in working with new aviation assets. The Wedgetail versus the AWACS also allows the system to become operational in flight significantly faster. And the Aussies operate the aircraft with no technicians aboard which means that with smaller staff they can get significant results within the operational envelope.

Coalition exercises are seen as a key venue for evolving the capabilities of the Wedgetail over time.

And indeed, this has already proven to be the case. According to participants in the squadron roundtable, when Wedgetail came to its first Red Flag exercise it was the new boy on the block and partners treated them understandably with kid gloves. But this was in the midst of sequestration so the US was reducing flying time for the AWACS and the Wedgetail immediately filled in and began to do coalition C2 for the exercise.

But fast forward to this year's Red Flag Nellis exercise and the Wedgetail was an accepted partner and operated both day and night in working on coalition operations.

As one participant said: "In a very short period of time, the system has evolved to take on greater responsibilities. And mastering an evolutionary process is what we are positioning ourselves in the squadron both with regard to our own and coalition forces."

Another participant noted that "because of the growth potential of the system in response to operational realities, we do not need to waste resources on redesigning the system prior to new capabilities showing up. We are a network management system so a key driver of the evolution will clearly be other assets emerging and then our working out with the new system our next code rewrite."

When I talked with the PACAF Commander in Hawaii he noted as well the important role, which Wedgetail can play.

According to "Hawk Carlisle", "I have been on the aircraft and it has just recently participated in Red Flag 2014. It is a very capable aircraft, but when it first showed up at an allied exercise in 2010 it has serious challenges with regard to interoperability. There have been huge strides with regard to its capability to be interoperable."

The final major piece to be added is the F-35. The F-35 is viewed as disruptive technology, which is embraced as such by the RAAF leadership. It is not just about doing things you can do now with a replacement aircraft; it is about doing things you can not do now with a transformational system.

The Aussie approach was discussed before, during and after a workshop held by The Williams Foundation on behalf of the Australian COS of the RAAF.

The focus of the seminar was on Air Combat Operations: 2025 and Beyond. The core emphasis was on the impact of the F-35 on reshaping the Australian combat approach appropriate to the challenges, which Australia faced in the region and beyond. The emphasis was on how to leverage fifth generation technology to generate ongoing air combat development in the decades ahead.

The Australian F-35 will enter into an environment of change and the central question addressed by the seminar was how to accelerate the kind of change necessary to deal with the threats and challenges in the neighborhood and beyond in the years ahead.

At the heart of the program were three speakers: SQNLDR Matthew Harper, No. 1 Squadron, Royal Australian Air Force, Lt. Col. Chip Berke and the VMX-22 Commander Mike Orr. These three operators addressed the question of what the fifth generation experience was all about and how that experience would affect the evolution of the force in the decade ahead. Having operators address the issue of transformation and transition really focused the audience, which included significant attendance by the next generation RAAF officers.

The USMC is starting its rotational engagement in Australia at the end of the month and it is clear that there is a potential opportunity inherent in the RAAF and the Aussie evolution of combat approaches with that of the modernization of the USMC approach both in the Pacific and in the MAGTF itself. In other words, the opportunity is not just for training but shaping relevant capabilities for 21st century operations.

After the seminar, I sat down briefly with Chip and Mike to discuss what they thought about their experience of the day. It was an unusual experience, in that they were being asked by their hosts to think through the future based on their experience in dealing with the new combat systems.

According to Col. Orr:

I was impressed that the RAAF is engaging in a process of examining the impact of the aircraft well before we are turning wrenches and flying the aircraft. As an air force they are thinking about the strategic impact of the F-35 on their operations, and how they are going to use it as a joint and coalition enabler. There is a clear recognition of what they are getting into. They are not buying it as a one for one enabler but as a tool to do things they simply cannot do today.

And the comments by Lt. Col. Berke really hit the nail on the head:

What I enjoyed the most about the interaction was the enthusiasm and embracing the future. This was in distinct from my experience at home where skepticism and resistance to change is so constant. The RAAF clearly is embracing the future and are enthusiastic about the coming of the F-35 as a key enabler of the future.

There is no question of should we: it is how do we. There is a full embracement of the necessity for the aircraft and how to get on with its transformational role and impact.

In short, the Australians are demonstrating that a mid-weight power with limited financial means and operating in a tough neighborhood can shape a transformational approach to airpower and to work towards a better integrated joint and coalition force. It can be done.

This article was first published in *Front Line Defence* (April 2014).

The Re-Set of Pacific Defense: Australia and Japan Weigh In

It may be the Pacific Century; but not the PRC Century.

At the Williams Foundation seminar on Air Combat Operations:2025 and Beyond, the director of the Kokoda Foundation, Dr. John Lee examined PRC perceptions militarily of the region. He noted that the Chinese are the number two economic power in the world, but have no strategic partners, except the North Koreans, which they would rather forget.

This means that as they shape their military strategy it can only be based on trying to fracture US relationships with its allies and but that, in reality, those allies are modernizing their capabilities to better defend their interests and to build out a new system of Pacific defense.

The F-35 Pac Fleet is a key deterrent of the PRC and will be built out over time into a more comprehensive defense structure.

When we published our book last Fall on shaping a 21st century strategy we emphasized the central role of allies and re-setting US approaches to embrace allies in the throes of defense modernization.

It is not about simply building out legacy assets to do classic power projection from the US or US bases to deal with threats in the region.

It is about inserting new capabilities within a distributed force development approach which cross cuts with allied modernizations.

My time in Australia has made it clear that the Aussies are sorting through a 21st century approach to their own modernization which will intersect not only with the US but other allies in the region.

And further north, the Japanese are reshaping their capabilities to provide for much more credible perimeter defense against the threats from North Korea and China.

Now the Japanese have published their 2014 budget documents which indicate their thinking about the way ahead; and those slides can be seen below:

Japanese SDF 2014

They have also released a video which lays out their strategic rethink and can be seen at the following link:

http://www.youtube.com/watch?v=2tT63npchUM

All of this fits into the strategic comments which I published earlier this year and am including below:

2014-01-09

Japanese national security strategy is in evolution.

In the most recent national security strategy, the Japanese government highlighted its latest iteration of what they called earlier "dynamic defense."

In an earlier piece, I wrote about the Japanese defense white paper of 2012 and highlighted the following:

This is the first white paper released since they announced their decision to acquire the F-35, and provides a further elucidation upon the new defense policy announced in 2010.

The Japanese announced in that year, that they were shifting from a static island defense, which rested upon mobilization, to a "dynamic defense" which required more agile forces able to operate in the air and maritime regions bordering Japan.

Notably, the Japanese recognized the need for these "dynamic defense" forces to be interoperable with allies to provide for the kind of defense Japan and the allies needed in light of changing dynamics in the region.

As the White Paper puts it:

It is necessary that Japan's future defense force acquire dynamism to proactively perform various types of operations in order to effectively fulfill the given roles of the defense force without basing on the "Basic Defense Force Concept" that place priority on "the existence of the defense force."

To this end, the 2010 NDPG calls for the development of "Dynamic Defense Force" that has readiness, mobility, flexibility, sustainability, and versatility, and is reinforced by advanced technology based on the latest trends in the levels of military technology and intelligence capabilities. The concept of this "Dynamic Defense Force" focuses on fulfilling the roles of the defense force through SDF operations.

Rather than simply focusing upon a narrow understanding of the defense of Japan proper, the shift was being made to extended defense of Japan understood as an extended perimeter of defense.

Now the Japanese government has released a new National Security Strategy, which highlights an even more comprehensive look ahead built around what they call building a "comprehensive defense architecture."

The Japan Maritime Self-Defense Force helicopter destroyer JS Kurama leads ships during a rehearsal for the 2009 fleet review. More than 8,000 civilians toured selected ships and viewed the rehearsal. Credit: USN, 10/21/09

Such an architecture is built on effective joint forces, a close working relationship with key allies, such as the United States, Australia and Japan and a proactive approach in which "Japan will maintain an improve a comprehensive architecture for responding seamlessly to an array of situations, ranging from armed attacks to large-scale natural disasters."

Clearly this approach is not just a briefing board document.

Recent events have demonstrated the Japanese engagement in the Philippine relief mission, including closely working with US forces in coming quickly to the aid of the Philippines and then moving out when no longer needed, and scrambling their Air Force in response to the Chinese unilateral declaration of an air defense identification zone.

The new strategy highlights the importance of Japan being a "proactive contributor to peace," rather than just sitting back and hoping someone else takes care of their defense interests. The strategy focuses on the importance of protecting Japanese access to global supply chains and to natural resources, including energy.

And in so doing, protection of sea lines of communication is a key challenge facing Japan and its allies.

The document clearly underscores a Japanese approach to be more proactive but in a broader alliance context, within which the relationship with the United States. But message to the US: you need to be proactive as well.

And part of the SLOC issue involves the Arctic, which is part of an expanded Pacific in any case.

"The Arctic Sea is deemed to have enormous potential for developing new shipping routes and exploration of natural resources. While it is expected that states concerned work together under relevant international rules, such potential could provide new causes of friction among them."

Japanese Air Self-Defense Force F-15J Eagles fly in formation during RED FLAG-Alaska 12-2 June 11, 2012, Eielson Air Force Base, Alaska. Credit: 354th Fighter Wing

The document makes it clear that Japan is not simply going to sit back and be intimated by North Korea and China. And Japan is not simply arguing in black in white terms, war or peace, but the necessity to be engaged in shaping a security environment which meets the interests of Japan and its allies.

"In addition to the issues and tensions arising from the shift in the balance of power, the Asia-Pacific region has become more prone to so-called "gray-zone" situations, situations that are neither pure peacetime nor contingencies over territorial sovereignty and interests.

There is a risk that these "gray-zone" situations could further develop into grave situations."

And later in the document, the importance of being able to operate across the spectrum of security and defense is highlighted as well, including an ability to operate in such "gray zone" situations.

"Even in peacetime, Japan will maintain and improve a comprehensive architecture for responding seamlessly to an array of situations, ranging from armed attacks to large-scale natural disasters."

What is underscored in the new strategy is the importance of blending military, security and political initiatives together in expanding effective Japanese alliance relationships.

This approach is highlighted in the discussion of how to deal with SLOC defense.

In particular, sea lanes of communication, stretching from the Persian Gulf, the Strait of Hormuz, the Red Sea and the Gulf of Aden to the surrounding waters of Japan, passing through the Indian Ocean, the Straits of Malacca, and the South China Sea, are critical to Japan due to its dependence on the maritime transport of natural and energy resources from the Middle East.

In this regard, Japan will provide assistance to those coastal states alongside the sea lanes of communication and other states in enhancing their maritime law enforcement capabilities, and strengthen cooperation with partners on the sea lanes who share strategic interests with Japan.

In our new book on Pacific strategy written with Ed Timperlake and Richard Weitz, a major part of the book focuses on the emergence of Japan and the centrality of the US-Japanese relationship in reshaping the US approach in Pacific defense.

Japan will play a central role in the reshaping of Pacific defense in response to the challenges of the second nuclear age, China and the Arctic opening. This is not the early post-war Japan.

This is a Japan which correctly recognizes the 21st century is not the 20th.

In effect, since the end of the Cold War, Japan is evolving through two clear phases with regard to defense and security policy and is about to enter a third. The first phase was extended homeland defense, where the focus was primarily on defending the homeland from direct threats to the homeland. A more classic understanding of defense was in play, whereby force had to be projected forward to threaten Japan and as this threat materialized, defenses need to be fortified.

It was defense versus emergent direct threats to Japan.

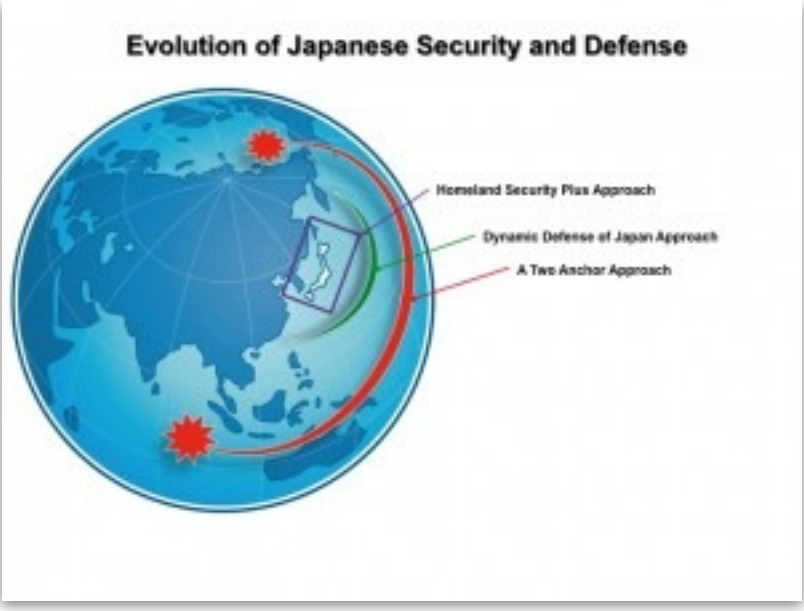
Life changed. Technology made warfare more dynamic, and the nature of power projection has changed.

The reach from tactical assets can have strategic consequences, the speed of operations has accelerated and operations highlighting the impact of "shock and awe" high speed operations made it clear that relatively static defenses were really not defenses at all.

At the same time, globalization accelerated, and with it the global significance of maritime and air routes and their security for the viability of the Japanese way of life. When terrorists crashed directly into the World Trade Center, Japanese got the point.

No man was an island, and neither was an island economy simply protected by having a global policy of shopkeepers.

More was required to defend the Japanese way of life.



The Evolution of Japanese Defense and Security; Credit: Second Line of Defense

The emergence of the Chinese colossus and the greater reach of the Korean crisis into a direct threat to Japan, and the resurgence of Russia, its nuclear weapons and its military forces, all posed the question of threats able to reach Japan rapidly and with significant effect.

A static defense made no sense; a "dynamic defense" became crucial. This meant greater reach of Japanese systems, better integration of those systems within the Japanese forces themselves, more investments in C2 and ISR, and a long-term strategy of re-working the U.S.-Japanese military relationship to have much greater reach and presence.

The "dynamic defense" phase carries with it the seeds for the next phase – the shaping of a twin anchor policy of having reach in the Arctic and the Indian Ocean.

Obviously, such reach is beyond the capabilities of the Japanese themselves, and requires close integration with the United States and other allies. And such reach requires much greater C2, ISR and weapons integration across the Japanese and allied force structure.

The great strength of U.S.-Japan alliance rests not only on a linage of mutual respect for sea operations, and now shared technology, but also Japan also creates a North/South Combat Axis for operations.

Instead of leaving the United States with a Hawaiian-centric strategy with the need to focus on going to West Pac East-West, the Japanese contribution is a very strong (or at least growing again) as a maritime ally which can, in partnership with the United States, help the US go North-South from Japanese Bases to cover an operational area ranging from Pacific Arctic to the Indian Ocean.

And U.S. systems are a key part of the Japanese approach. Clearly, at the top of the list is building out from the Aegis global partnership to include Ospreys and F-35s as centerpiece items. Japanese F-35s would be part of the Pacific fleet of US and allied F-35s and Japan is where the first F-35s are coming in 2015 and by 2020 there could be as many as 5 squadrons of F-35s, USMC, USAF, and Japanese.

This will clearly be the center of excellence for the fledgling F-35 enterprise.

And added to this, the Japanese will build their F-35s in rebuilt Mitsubishi facilities, thus becoming the third final assembly line for F-35s, with Fort Worth, and Cameri, Italy, the other two.

The cross domain synergy among these new systems combined with Japanese integration with their legacy systems are the building blocks for the new "comprehensive defense architecture."

And to conclude: there is a fundamental difference from PRC and Japanese goals and context. The PRC is an authoritarian regime seeking to reshape international rules to their benefit; Japan is a democracy embedded in alliances seeking to see that international rules are crafted and created which support globalization, not domination.

There is no moral equivalence here.

Rather than asserting that there is a "global commons," the US and its allies are working to ensure that there will be a functioning global commons in the decades ahead.

This is not about conceptual dominance, but about realpolitik.

An earlier version of this piece was published on *Breaking Defense*.

http://breakingdefense.com/2014/01/japan-re-shapes-its-national-security-strategy/

Modernization Building Blocks Shaping a 21st Century Australian Force

The Royal Australian Air Force Adds New Tanking Capability; A Key Step in Building Out Its Reach, Range and Sustainability

By Robbin Laird

During my visit to Australia, I have had a chance to visit No. 33 Squadron, at Royal Australian Air Force (RAAF) Base Amberley in the state of Queensland. The Squadron operates the KC-30A Multi-Role Tanker Transport (MRTT).

My mentor and guide for my day at the base was Squadron Leader Chetan Takalkar, Executive Officer of No. 33 Squadron. I also had a chance to talk with the head of the MRTT program in the Australian Department of Defence (DoD), based in Canberra. These talks were then supplemented by discussions with other very senior Australian DoD officials in Canberra about the way ahead, within which the tanker is viewed as a foundational element.

During my time at the squadron, RAAF officers took me through the simulators and let me try my hand at lowering the virtual boom to tank an F-16.

Two of the five planes were at RAAF Base Amberley during the visit.

Three of the five Aussie tanker aircraft are currently involved in maintenance, upgrade, testing, and residual acquisition activities in Madrid and Australia. The squadron fleet should be at full strength in 2015.

Last year, in combination with Australian C-17s, the KC-30A squadron supported several F/A-18 deployments to Guam as well as Darwin and Tindal in Australia's Northern Territory. This activity demonstrated the ability of the RAAF to move an air wing and support it at extended range with a tanker, while also providing airlift support.

Members of the Royal Australian Air Force and U.S. Air Force Airmen work together to unload pallets from a KC-30 July 12, 2013, after the aircraft landed at Joint Base Pearl Harbor-Hickam, Hawaii, in support of Talisman Saber 2013. Talisman Saber forms part of the Australian Defense Force's extensive training program to ensure the ADF is

prepared to protect and support Australia and its national interests. Talisman Saber is a bilateral exercise designed to train Australian and U.S. forces in planning and conducting combined task force operations in order to improve combat readiness and interoperability. (U.S. Air Force photo by Staff Sgt. Nathan Allen)

This year the squadron has supported movement of Aussie F/A-18s from the United States across the Pacific and back to Australia.

Both operations underscore capabilities, which are part of shaping a 21st century Air Force.

From discussions at RAAF Base Amberley and in Canberra, it is clear that the squadron is a work in progress that represents a significant boost in capability for the RAAF. The tanker's potential is a clear advantage as seen by senior RAAF officers.

Standing up the squadron, finishing the procurement and getting initial use of the tanker underway is a prelude for what comes next – working through the best ways to use the tanker with the RAAF, and to work out its interoperable role in the region and beyond.

While the squadron provides support to Defense, it is still very much involved in finishing the acquisition process for the tanker. The RAAF has really the world's first operational squadron of the MRTT, and as the launch customer is working through the launch point for the foundational capabilities of the tanker. The Royal Air Force, United Arab Emirates Air Force, and Royal Saudi Air Force operate similar tankers, but Australia is in the lead in initial use of the tanker. India, Singapore and France are currently in the process of procuring MRTTs from Airbus Defence and Space as well.

And as they do so, the RAAF is flying the tanker and taking it through its paces and preparing for the next phase of expanding its interoperability as the boom system comes on line later this year.

Shaping interoperability with a clear role as both a national and regional asset is a strategic goal of the RAAF. This will require sorting out common procedures with the United States Air Force and regional and global partners, but this is clearly a core effort in the works for the period ahead.

Squadron Leader Chetan Takalkar, Executive Officer of the No. 33 Squadron, has been working with the tanker since 2005. He has spent 5 years living in Madrid and working with Airbus Military (which changed its name to Airbus Defence and Space in early 2014) to get the launch product ready for entry into the RAAF.

During my interview with Takalkar, he outlined the challenges associated with moving the squadron towards operating a fully mature, sophisticated and highly capable air-to-air refueling asset.

The focuses for the RAAF MRTT capability are on finalizing the delivery of the boom system, leading to final acceptance and maturing the in-service support and training system.

An Operational Test and Evaluation program will be used to explore the full potential of the MRTT capability, including additional receiver clearances beyond the Hornet and Super Hornets (including the E-7A Wedgetail Airborne Early Warning and Control aircraft; C-17A; F-35A Joint Strike Fighter; P-8A Poseidon; and other KC-30As), as well as allied aircraft.

Takalkar emphasized that in the past few months, the squadron was supporting F/A-18 operations within Australia, and will soon support the attendance of the fighters at allied overseas exercises.

I am departing tomorrow to support a trans-Pacific deployment of our Hornets.

We'll meet our fighters just off the West Coast of America and then transit to Hawaii and thence Guam.

Then they'll move from Guam back to Australia, all done in a matter of days For us, the KC-30 is a significant increase in capability and this deployment is an excellent demonstration of RAAF airpower.

It also needs to be remembered that the last Aussie tanker, a fleet of Boeing 707s, retired in mid-2008, and that in the interim the RAAF has leased tankers from other provider or utilized available capacity from United States Air Force.

The RAAF's Boeing 707s were equipped only for hose-and-drogue refueling, meaning the RAAF is about to embark on boom tanking for the first time.

The gap in air-to-air refueling capability has meant that No. 33 Squadron has had to train Air Refueling Officers or "tankers" to learn their profession. The Air Force has also had to shape a Concept of Operations to operate with air assets within and external to the RAAF, such as the USAF, who are world leaders in air-to-air refueling.

With the boom coming online, the RAAF will be in a position to support both Universal Aerial Refueling Receptacle Slipway Installation (UARRSI) fitted aircraft and probe and drogue capable aircraft.

Delivery of this capability will provide a significant force multiplier for key Defense weapon platforms including the E-7, C-17A and the recently announced P8-A and the likely replacement for the FA-18A/B, the F-35.

The boom will dramatically expand the RAAF's ability to work with allied air forces. Additionally, working with regional partners like the Republic of Singapore Air Force, which is acquiring the same aircraft, will be an important part for the future of the MRTT/KC-30A capability.

Takalkar was enthusiastic about the coming roles with allies, and the ability to shape a fleet concept of operations with allies as well.

Steps are already underway. Takalkar and squadron executives discussed the work in progress with the US Navy to certify the Aussie tanker to tank US Navy F/A-18s. There is no reason not to do the same with other United States military receivers, especially in light of growing Australian-US defense cooperation that could see increased numbers of American units training in Australia.

CAE is the provider of the simulator and training for RAAF KC-30A pilots and air refueling operators. Discussions with the CAE team prior to entering the two simulators highlighted the fact that the MRTT's evolution had been reflected within the simulator through numerous software upgrades.

The RAAF pilots and tankers underscored that the simulator worked very well as a training tool, and indeed Takalkar commented during the discussions with CAE that the 90-day training period prepared the team well, and they could confidently be deployed rapidly into operational experience.

Later, I had the chance to discuss the tanker with the head of the MRTT program, Air Vice-Marshal (AVM) *Chris* Deeble. The tanker is viewed as a key element of shaping a 21st century RAAF, and indeed Deeble is heading soon to the RAAF's F-35 program as its Program Manager.

There have been problems with the boom on the tanker, but according to the head of the MRTT program in the Australian Department of Defence, the boom problem is well on the way to being resolved.

According to AVM *Deeble*, "We expect the boom to complete testing and undergo acceptance around third quarter of 2014."

He indicated that the MRTT boom is a very advanced system, which provides significantly more capability than existing boom systems. He has been working on the program for some time and commented that challenges with the boom have been both software and hardware.

"There are elements of the hardware which have posed problems aerodynamically; and the integration of the software and hardware to ensure the required operating envelope have taken some time to develop."

We are conducting the final Developmental and Qualification Test and Evaluation, which should be complete by mid 2014.

We are focused on providing the RAAF with a firm basis for growing the boom capability by the end of 2014.

Working collaboratively with Airbus Defence and Space through these final phases of the program will be key to delivering a world class tanker capability to the RAAF.

Clearly, the recent decision by Singapore to select the MRTT to replace its own fleet of KC-135Rs validates the position taken by the Australian Department of Defence. Indeed, AVM Deeble indicated that supporting Singapore during their acquisition program will remain a priority for RAAF and will ensure an interoperable regional MRTT capability.

Background: The Tanker Squadron is an integral part of the RAAF's Air Lift Group.

According to the RAAF website:

Air Lift Group is one of the largest Force Element Groups within Air Force. Air Lift Group operates six aircraft types from three separate RAAF Bases and from Defence Establishment Fairbairn in Canberra.

It was formed in February 1987 and is responsible for providing the Australian Defence Force's combat air mobility capability, which comprises the following roles:

- air logistics support

- airborne operations
- special operations
- VIP transport
- air-to-air refuelling
- search and survivor assistance
- aeromedical evacuation
- training

It directly controls Nos 84 and 86 Wings and the Air Mobility Control Centre from its headquarters at RAAF Base Richmond. It is also responsible for Air Movements Training and Development Unit.

Air Lift Group has been at the forefront of Defence operations, given its role of delivering personnel, cargo and equipment where it needs to go. This includes extensive service in the Middle East Area of Operations since 2001, East Timor, the Persian Gulf, Cambodia, West Africa and throughout the Pacific.

Air Lift Group has also been extensively involved with humanitarian missions, including the following:

- Delivering urban search and rescue workers to Japan following the 2011 Tsunami / Earthquake, as well as conducting internal airlift flights in Japan and delivering remote water cannon equipment from Australia.
- Delivering urban search and rescue workers to New Zealand following the Christchurch Earthquake, and returning Australian citizens.
- Conducting relief flights to northern Queensland following the Cyclone Yasi, including assisting in the evacuation of almost 200 hospital patients from Cairns area to Brisbane on 1-2 February.
- Relieving flood-affected communities in Queensland and Victoria in 2011.

Previous humanitarian tasks have included supporting Operation Pakistan Assist I and II (2005 and 2010); recovery of Australians killed in the Kokoda aircrash in Papua New Guinea in 2009; the Australian Government's response to Cyclone Nargis in Burma in 2008; the response to Cyclone Larry in North Queensland in 2006; and the Indian Ocean Boxing Day Tsunami in 2004.

Conducting aero-medical evacuation flights for the following:

- Evacuations from Vietnam and Darwin after Cyclone Tracy
- Rabaul volcanic eruption 1994
- Bali bombings 2002 and 2005
- Passengers of Suspected Illegal Entry Vessel 36 in April 2009

https://www.airforce.gov.au/About-us/Structure-of-the-RAAF/Air-Command/Air-Lift-Group/?RAAF-sNFA62I5DlLtVOqidVYBjGwjkHSoZlFd

The Wedgetail Enters Into Service: The Aussies Build Out Their 21st Century Airpower Capabilities

The Aussies entered the 21st century with an aging Air Force.

The silver lining in that difficult position is that as the Royal Australian Air Force (RAAF) began to modernize, they could do so within the context of new 21st century capabilities.

The process really began by adding the C-17, which was at the end of its production run, but introduced a new lift capability for the force. The reach, range and lift performance of the aircraft was important for the Afghan engagement, but will become a key asset as the Aussies focus primarily on Pacific defense.

The new A330MRTT tanker is the next piece. The impact of the tanker, which is refuelable, will be significant in allowing the Aussies (individually and in terms of coalition contributions) to engage with extended reach, range and endurance in the Pacific.

And operating in extended reach and range to protect the borders of Australia, to operate within the strategic quadrangle from Japan, to Guam, to Singapore and to Australia, will be new aircraft able to manage the battlespace with 360 degree extended reach.

The coming of the F-35 is a key piece of the re-set of airpower in Australia, but the air battle manger for the RAAF will be the new Wedgetail aircraft.

Second Line of Defense had a chance to visit the Wedgetail squadron at the Williamtown, RAAF base on March 6, 2014. In a broad discussion with the squadron, the key elements of the contribution of Wedgetail and its projected evolution over time were discussed.

According to the Australian MOD website:

The first E-7A Wedgetail Airborne Early Warning & Control (AEW&C) aircraft was delivered to Australia in 2009 and began operations in 2010. A total of six aircraft have been delivered to Australia.

The E-7A Wedgetail represents an entirely new capability for the ADF, providing a platform that will gather information from a wide variety of sources, analyze it and distribute it to all friendly air and surface assets. AEW&C aircraft can control the tactical battle space, providing direction for fighter aircraft, surface combatants and land based elements, as well as supporting aircraft such as tankers and intelligence platforms.

Based on the 737-700 commercial airliner airframe, the E-7A features advanced multirole electronically scanned radar and 10 state-of-the-art mission crew consoles that are able to track airborne and maritime targets simultaneously.

AEW&C aircraft elevate the radar 10,000 meters above the earth's surface so that the radar can 'see' everything out to a range of hundreds of kilometers. Low flying aircraft can no longer 'sneak up' by approaching below the radar horizon.

An E-7A Wedgetail cruising at an altitude of 10,000 meters can maintain surveillance over a surface area of 400,000 square kilometers at any given time. Over a 10-hour mission, the Wedgetail could cover over four million square kilometers.

The E-7A Wedgetail is therefore a major new capability for the Australian Defense Force, which will significantly multiply the effectiveness of our existing Navy, Army, Air Force and Coastwatch, and help Australia maintain a capability edge well into the future. The E-7A Wedgetail is truly the "Eyes of the Nation".

The E-7A Wedgetail aircraft are operated by No 2 Squadron from RAAF Base Williamtown, near Newcastle.

Initial Operational Capability for the E-7A Wedgetail platform was announced in November 2012, and Final Operational Capability for the Wedgetail fleet is planned for late 2013.

It is clear that this is a new capability for Australia. And the squadron, which has a distinguished combat record, is approaching the aircraft with a sense of enthusiasm, adventure and willingness to explore new ways it might be used. The backgrounds of the squadron are diverse with navy and air force operators mixed in, and with a wide range of experience in airborne surveillance and battle management, including several years of operational experience with the RAF on the AWACS.

For an American who grew up from the 1950s and is used to the US introducing new systems first and then allies following, the Wedgetail is a whole new experience. When you visit Australia you get to see the E-10 we did not buy (Wedgetail) nor the A330MRTT tanker which we did not buy either.

This puts the Aussies in a rather odd situation whereby they are at the leading edge of 21st century changes, coupled with working with the USAF main contribution to this effort, the F-22.

What is the current state of play with regard to the Wedgetail?

According to the Squadron Commander, the system is "on the books" and ready to go to serve Australian needs and to contribute to coalition defense.

The Squadron Commander highlighted that the message going forward with the squadron was three fold: grow, integrate and prepare. Growth meant simply to fill out the squadron and enhance its operational capabilities. Integrate meant to build the squadron's ability to work within the battlespace, to work effectively with the other Aussie forces and with coalition partners. Prepare for the system will always be evolving.

The always evolving part of it is not widely appreciated.

This is a software upgradeable aircraft with a defined launch point (IOC) but no fixed end point (FOC). The system will always be evolving and growing as the software code gets rewritten to reflect events and demands from the squadron.

The squadron works through its experience and shapes change orders which get sent to the procurement authorities to sort out priorities for the next round of upgrading the aircraft.

The difference between older and such a new system was outlined by one participant in the roundtable as follows:

"We have in the same time frame bought a CRC system full up which will look pretty much like it is in 20 years; with Wedgetail it will look nothing like it does now in 20 years."

The Aussies have named their tanker squadron the Dragons, so here we see at No. 2 squadron the technology Maoists focusing on "continuous revolution" provided for a software upgradeable aircraft. With the coming of the F-35, which is also a software upgradeable aircraft, the Aussies are getting real operational experience with software upgradeability with the Wedgetail squadron.

And make no mistake: this is not simply a new form of AWACS. The AWACS is pushing the upper limit of what it can do. The MESA radar on the Wedgetail is a whole other animal, able to reshape what a battle management radar can do over time in working with new aviation assets.

The Wedgetail versus the AWACS also allows the system to become operational in flight significantly faster. And the Aussies operate the aircraft with no technicians aboard which means that with smaller staff they can get significant results within the operational envelope.

There are other nations operating Wedgetail, namely South Korea and Turkey. And the squadron will operate later this year with both countries. But US ITAR restrictions limit the under the hood cross-learning available from nations working the same aircraft, a restriction which may make no sense when South Korea and Australia will operate more and more together within the strategic quadrangle.

Coalition exercises are seen as a key venue for evolving the capabilities of the Wedgetail over time.

And indeed, this has already proven to be the case.

According to participants in the squadron roundtable, when Wedgetail came to its first Red Flag exercise it was the new boy on the block and partners treated them understandably with kid gloves. But this was in the midst of sequestration so the US was reducing flying time for the AWACS and the Wedgetail immediately filled in and began to do coalition C2 for the exercise.

The Aussie Wedgetail is a player in a 21st century aerospace combat cloud for the Pacific. Royal Australian Air Force personnel prepare the E-7A Wedgetail for a Red Flag exercise, June 11, 2012. Credit: Joint Base Elemendorft-Richardson. 6/11/12

But fast forward to this year's Red Flag Nellis exercise and the Wedgetail was an accepted partner and operated both day and night in working on coalition operations.

As one participant said: "In a very short period of time, the system has evolved to take on greater responsibilities. And mastering an evolutionary process is what we are positioning ourselves in the squadron both with regard to our own and coalition forces."

Another participant noted that "because of the growth potential of the system in response to operational realities, we do not need to waste resources on redesigning the system prior to new capabilities showing up. We are a network management system so a key driver of the evolution will clearly be other assets emerging and then our working out with the new system our next code rewrite."

A case in point is the coming of Aegis to the destroyer fleet and the new amphibious ships as well with their C2 systems.

And a coalition opportunity could well be the coming of the USS America, a new type of large deck amphib, to the Pacific later this year, which could provide an opportunity for cross learning as well.

And the coming of the F-35 to the Australian force will generate its own challenges. The Wedgetail will then have to work with F-35s and legacy aircraft to shape the operational battlespace, but in situation where the F-35s will not operate at all like 4th generation aircraft.

Not surprisingly, the squadron is already working on the way ahead.

"With fourth generation aircraft, your role is to shape the strike mission and to help coordinate an effective operation. The F-35 is individually its own little battle manager and the challenge then is to provide a broader area management role. And the transition between the two or put another way the management of the two capabilities within a single air campaign will be a significant part of the transitional challenge we will face in the decade ahead."

The challenge transition will not need to wait for the coming of the F-35 to Australia for the Wedgetail is already working with the F-22s, certainly within the Red Flag and other coalition exercises.

This Wedgetail experience also highlights the coming impact of the F-35 in another way.

Coalition partners will use the F-35 in different ways, and exercises will allow the US to learn from partners about how to evolve 21st century air operations.

For a kid that grew up in the 1950s, this is clearly a new century.

Background: The MESA Radar

As the designer of the system, Northrop Grumman, has put it about the MESA radar:

Legacy AEW systems have higher drag antenna configurations and are limited by mechanical scan rates of 10 to 12 seconds. In contrast, the MESA radar has variable scan rates and instantaneous target revisit rates to satisfy diverse mission priorities. Battle managers can assign multiple emphasis sectors with extended range and update rates while maintaining a 360-degree background surveillance picture.

MESA's radar/IFF system is powered by 288 high-power T/R (transmit/receive) modules driving two side arrays and a "top hat" array. Each array has a large aperture for high gain and directivity of the radar and IFF beams. The "top hat" provides fore/aft coverage for full 360-degree surveillance coverage. This configuration provides radar target tracks through aircraft turns and maneuvers.

MESA is designed to operate with graceful degradation, extending available operating hours for both radar and IFF. MESA's reliability is higher than AEW systems with separate IFF and radar systems due to fewer parts and shared system hardware between functions.

Operating at L-band enables long-range air and maritime search/track and IFF — all in one multifunction aperture system. IFF responses can exceed radar detections, providing cooperative target detections and situational assessments before targets penetrate radar surveillance coverage. Additionally, L-band provides better detection in rain than higher frequency AEW radars as well as longer range detection of smaller targets.

MESA provides wide area surveillance of greater than 340,000 square miles at rates exceeding 30,000 square miles per second for a typical 10-second scan rate. Since scan rates are variable and sectors selectable, other coverage rates, ranges and priorities are programmable by mission commanders. Four-dimensional processing, with monopulse angle processing, provides accurate range, azimuth and elevation locations. Doppler processing resolves closely spaced targets in formations.

The Aussie Wedgetail and Air Battle Management in Red Flag 2014

During the exercise AWACS and Wedgetail played the core command and control role and F-22s in Alaska (which includes one flown by an Aussie exchange pilot) worked effectively with Wedgetail.

Wedgetail is a software upgradeable aircraft with regard to its core systems, notably the radar, and has evolved since its first appearance in 2010 at a multi-national exercise into a more interoperable platform.

From left) General Hawk Carlisle, Pacific Air Forces commander; Mr. Scott Dewar, Australian Consul-General in Honolulu, Hawaii; and Maj. Gen. Kevin Pottinger, PACAF Chief of Operations, climb aboard a Royal Australian Air Force E-7A Wedgetail Airborne Early Warning & Control aircraft on the flightline at Joint Base Pearl Harbor-Hickam, Hawaii, August 26, 2013. The RAAF Wedgetail and crew were at JBPH-H on a stopover on the return home from participating in Red Flag-Alaska. AEW&C aircraft can control the tactical battle space, providing direction for fighter aircraft, surface combatants and land based elements, as well as supporting aircraft such as tankers and intelligence platforms. RAAF Wedgetail crew provided static displays and a familiarization flight to JBPH-H personnel, to familiarize Airmen with RAAF Wedgetail capabilities. (U.S. Air Force photo/Staff Sgt. Nathan Allen)

According to the PACAF Commander, "Hawk" Carlisle, the close working relationship between the Australian Air Force (the RAAF) and the USAF has been part of the trajectory of enhanced interoperability delivered by the Wedgetail.

The ability to evolve the capability of a software upgradeable aircraft (the F-35 is one as well) was highlighted in one of the RAAF interviews conducted by the Australian defense journalist Ian McPhedran in his book *Air Force*:

'Someone asked me, "When will we get the full technical maturity out of Wedgetail?

" I answered "never" because it will just continue to grow and the capability will be far greater in 30 years than what it is now.'

McPhedran, Ian (2011-08-08). Air Force (Kindle Locations 5776-5777). HarperCollins Publishers. Kindle Edition.

And translating that working relationship into software code is part of the process of enhancing capability over time.

In a posting from the RAAF on February 23, 2014, the role of the Wedgetail in Red Flag was discussed.

About 300 RAAF personnel from around Australia deployed to Exercise Red Flag held between 21st Jan — 15 Feb 2014.

The Exercise was conducted on the 15,000-square-mile Nevada Test and Training Range, north of Las Vegas in the United States.

The large scale exercise involved experienced aircrews from different air forces, including the United States and Great Britain flying strike, electronic warfare, tactical transport, fighter escort, airborne warning and control and air to air refueling missions against dedicated defensive fighter aircraft and an extensive range of simulated surface to air threats.

Exercise RED FLAG is one of a series of advanced training programs administered by the U.S. Air Force Warfare Centre and Nellis Air Force Base, through the 414th Combat Training Squadron.

Hypersonics as an Integral Part of the Future of Australian Defense: A Key Research Team Works the Challenges

Second Line of Defense recently visited Australia and talked with a number of Australian military and scientists about the evolving approach to shaping capabilities for the defense of Australia and the emergence of a new allied approach to Pacific defense.

The new tanker and Wedgetail are certainly part of the effort, as well as the coming of the F-35 to Australia as part of a broader F-35 Pacific fleet, both US and allied. But a less visible element is hypersonics and the potential for the weapons revolution.

As we know from our time with Dr. Mark Lewis, the longest-serving Chief Scientist in Air Force history and now head of IDA's Science and Technology Policy Institute, which supports the White House Office of Science & Technology Policy and the National Science Foundation, that hypersonics will be a game changer.

A hypersonic rocket launches skyward during a March 22, 2010 test launch from the Woomera Test Range in Australia. The fight was part of the joint U.S.-Australian HiRise project to test and develop hypersonic vehicles for future aircraft transportation. Credit: Australia Defense Science and Technology Organisation

In the words of Lewis in an SLD interview:

Modern warfare is about doing things quickly. It's about achieving fast effects, getting results quickly. If you want to affect something quickly, I can think of basically three options.

The first option is that you have ubiquitous presence. That means you've got an asset anywhere you need it. That asset might be unmanned, and frankly, that's a lot of what remotely piloted aircraft are enabling for us – having small assets available and re-locatable at a moment's notice. Of course, ubiquitous presence is only good in a limited area; we obviously can't have ubiquitous presence at every location around the globe, but that's one part of the solution that is already changing warfare.

The second option for doing things quickly is to operate at the speed of light. For my aerodynamics friends, the speed of light is about a million times faster than the speed of sound. Operating at light speed means using directed energy systems and/or cyber systems, which are among the other things that Mr. Wynne championed when he was Secretary of the Air Force. And of course, there's a lot of development underway right now in directed energy systems, and lots of corresponding questions about how we ultimately would deploy them, as well as how we would ultimately use cyber systems.

If you don't have the first two available, or if they cannot deliver the desired result, a third option is that you get to where you want to go as fast as you possibly can. That's the advantage of hypersonics. This could be to perform reconnaissance of some sort, do some sensing, or to deliver weapons on a target. In order to do that, we need to master the technology required to fly at hypersonic speeds.

Hypersonics would also give us a degree of invulnerability. We know that the application of stealth technologies has been a tremendous game-changer, but that stealth advantage won't last forever. I would argue that the next step beyond stealth is speed.

With the emergence of the second nuclear age, and competitors shaping extended reach for their missiles in their forces in the Pacific, even a continent "down under" is part of the 21t century defense challenge. Clearly, some Aussies get this, and see hypersonics as part of that challenge and an opportunity as well.

The recent Chinese tests reminded folks that this is a highly competitive world, and a dedicated effort to roll out hypersonic capabilities (with Russia, India, China and the US clearly in the mix) will be part of the future of warfare, whether one wants it or not.

Australia has a small but cutting edge team of hypersonic researchers, and with the test ranges to play out the evolving technologies, and with significant global working relationships, Australia is at the cutting edge of hypersonic research.

Research can clearly yield possible capabilities for space as well, with an ability to launch rapidly ISR and C2 capabilities for Australia and as part of the effort to overcome the tyranny of distance to deal with longer range threats and challenges as well.

SLD had a chance to sit down with a team of Australian hypersonics researchers to discuss the Aussie hypersonic effort and its progress.

The effort was discussed with Dr. Allan Paull and members of the hypersonics team close to Brisbane. Dr. Paull made it clear that the team was small but effective.

"We combine the skills of several disciplines but each member of the team takes ownership of the entire effort and provides inputs to each and every aspect of the enterprise. We are not organized around a model of deep pocket experts who stay within the confines of their specialty; we interact across the enterprise to push the research effort forward."

Dr. Paull emphasized that the hypersonic effort required progress in several technologies at the same time, materials, propulsion, computation, etc.

Visiting the workroom of the DSTO where two hypersonic vehicles are being worked on certainly reinforced the point that several moving parts are being worked toward the next hypersonic test point.

The key takeaway from the discussion with Dr. Paull was rather straightforward:

"By 2015 we will have finished our current round of tests, and by that time there is little question but that the basic scamjet technology works and can be leveraged moving forward."

Australia has worked with the USAF in building out a HiFire set of test vehicles.

The objectives of the program are two fold:

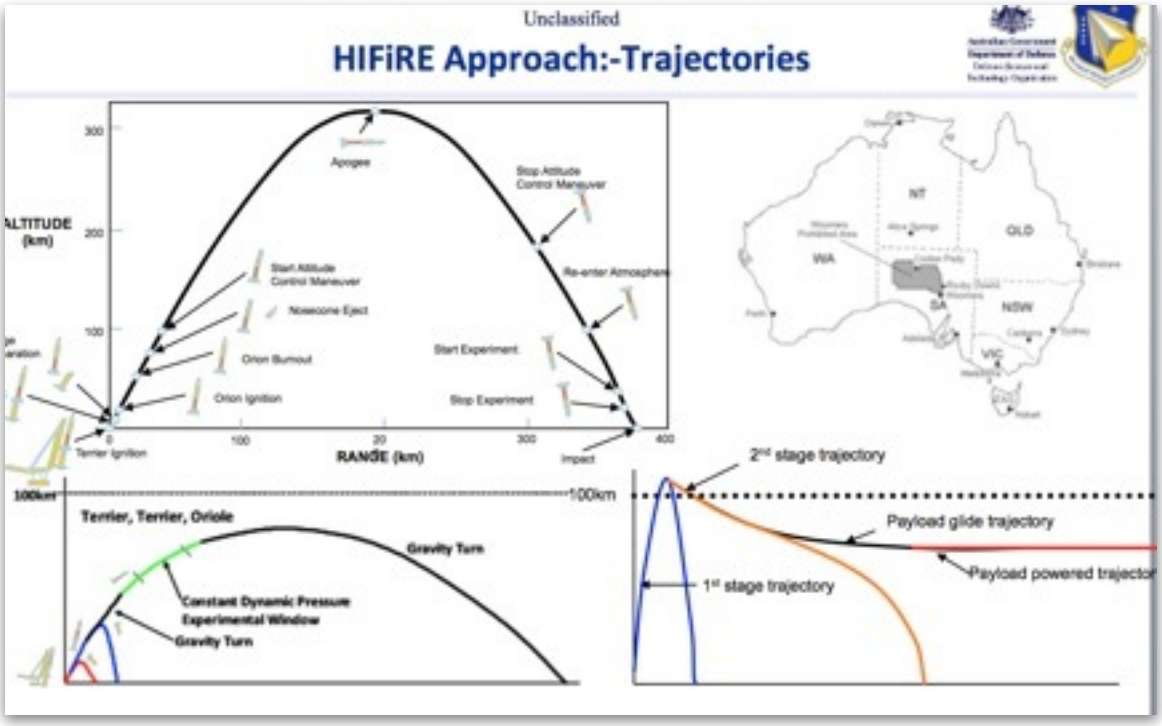
1. To develop the science and technology for hypersonic flight with air breathing propulsion;

1. Complete a horizontal flight of a scramjet-powered vehicle for a duration of 30 seconds.

An interesting aspect of the Aussie effort has been to build an engine, which can reach hypersonic speeds but fits into the center of a vehicle.

The team is working a number of innovations to achieve this result. Such an engine if proven out would be a major step forward in making practical use of scamjet technology.

The HiFire uses a high angle of attack profile as well which adds a potential of maneuverability to speed.



Much has been achieved by Australia working with its partners in hypersonic research in less than a decade. But the importance of this effort, and the need to be on the cutting edge is clear.

The timetable followed to date can be seen below:

For an overview on hypersonic research in Australia which summed up progress towards the end of the last decade and published by NATO see the following:

http://ftp.rta.nato.int/public/PubFullText/RTO/EN/RTO-EN-AVT-150/EN-AVT-150-11.pdf

Aussie Innovation: The Case of the ANZAC Frigate

The Australian company, CEA Technologies, has developed an innovative radar for the ANZAC class of frigates which provides significant detection capability throughout its operations and in heavy sea states as well.

It is Australia's largest majority owned Defence Company.

http://www.cea.com.au/!Global/Directory.php?Location=Home:Home

CEA works with Northrop Grumman Electronic Systems and NGES owns a 49% share of the company.

(For an overview on the company see the following:

http://www.cea.com.au/News+Media/Attachments/2012-0005.pdf).

According to a recent story in the weekend edition of *The Australian* (February 15, 2014):

LAST year, during a naval exercise off California, a dummy missile fired at an American warship roared through the cruiser's defences and slammed into its superstructure, starting a fire and injuring two sailors.

The dummy missile, with no warhead fitted, punched a hole half a metre wide in the port side of the guided missile cruiser USS Chancellorville, which returned to port for repairs.

When a similar American missile was fired at the Australian frigate HMAS Perth in an exercise off Hawaii, the Australian crew shot it down using technology developed in the suburbs of Canberra and Adelaide.

The Australian warship – dubbed "Robo-Frigate" by the navy after its exploit – is now considered the most advanced vessel of its class in the world.

Building on the spectacular success of the frigate's homegrown missile-defence system, Defence Minister David Johnston has invited allied ambassadors for a briefing on it later this month.

Senator Johnston told The Weekend Australian the new technology had proved more effective and less expensive than the best in the world.

Those involved in developing the system say the Americans and several other navies have already shown a keen interest in buying the system, opening up export possibilities for Australian defence technology that could be worth billions.

HMAS Perth was the first of the navy's eight ANZAC-class frigates to be fitted with the phased array radar and combat-management system, which proved able to defend it even against supersonic, sea-skimming missiles.

HMAS Perth's commanding officer, Captain Lee Goddard, said the exercise was so realistic that, while the frigate's crew knew missiles were going to be fired at them, they had no idea when that would happen or what direction the missiles would come.

http://www.theaustralian.com.au/national-affairs/policy/defence-system-could-earn-billions/story-e6frg8yo-1226827664130#mm-premium

Australia Prepares for its New Amphibious Assault Ship: An Aussie Perspective from Bold Alligator 2013

Australia is re-shaping its forces as it deals with the dynamics of change in the Pacific and its roles and tasks post-Afghanistan. Part of the future approach will be provided by the delivery of a new capability in the Aussie force structure, namely a large LHD or Amphibious Assault Ship.

As reported by the Royal Australian Navy (http://www.navy.gov.au/fleet/ships-boats-craft/lhd):

The Canberra Class Amphibious Assault Ship (LHD), also known as a Landing Helicopter Dock, project will provide the Australian Defence Force with one of the most capable and sophisticated air-land-sea amphibious deployment systems in the world.

These 27,000 tonne ships will be able to land a force of over 2,000 personnel by helicopter and water craft, along with all their weapons, ammunition, vehicles and stores.

The ships are being bought to support Amphibious operations, but will also have a key role in Humanitarian Assistance and Disaster Relief (HA/DR).The ships are large enough to accommodate the changes in aviation which will see personnel able to operate from the sea platforms in the years to come. The innovations, which the French have shown with a smaller ship, the Mistral, suggest that a larger amphibious ship could evolve with the times, quite nicely.

During the Libyan operations, the French used their premier armed helicopter, the Tiger, for the first time at sea. The Australians are also developing their armed reconnaissance helicopter capability, using the Tiger, so may seek to employ it from a sea platform similar to the French.

In a good overview of Aussie thinking, an Australian defense analyst wrote a piece entitled "in war and peace, an amphibious capability is apt."

According to John Blaxland, a senior fellow at the Strategic and Defence Studies Centre at the Australian National University:

Australia is in the process of acquiring two amphibious landing helicopter dock ships (LHDs) built by Spain's Navantia and BAE Systems Australia following the design of the Spanish navy (Armada de Espana) LHD. The first semi-completed one arrived in Australia on October 17, 2012.

On this occasion it is worth reflecting on the parallels of the Spanish and Australian amphibious capabilities. Interestingly, Spain maintains an amphibious fleet of an LHD, two landing platform docking ships (LPDs) and a landing ship tank (LST), sister of former HMA ships Manoora and Kanimbla. This is a configuration not unlike the one the Royal Australian Navy will have once the new LHDs come into operation. Spain lost its Latin American empire two centuries ago; so why does the Spanish navy need a four-ship amphibious capability?

As it turns out, the Spaniards place big emphasis on maintaining an amphibious warfighting capability, with an embarked force drawn from the world's oldest marine corps, predating the US Marines by more than two centuries (it was created in 1537). The force also includes its own integral onboard air power to operate against adversaries in contested situations. Spain recognises that developing and maintaining its amphibious capability is of the highest order of difficulty. Spain places high priority on ensuring

the three armed services work together intimately to make the capability work properly in an opposed setting. But Spain also recognises that this capability enables it at short notice to provide humanitarian assistance and disaster relief…..

The utility of this approach has strong echoes in Australia's region. With its four-ship amphibious flotilla, Spain was able to act promptly and play a prominent role in disaster relief after the earthquake in Haiti in January 2010, much as they had done after a hurricane in Central America in 1998-99. When port facilities were destroyed and inoperable, Spain's amphibious ships were able to operate off Haiti's coast, providing a range of capabilities in support of the international relief efforts, reaching the shore with its amphibious craft and helicopters…..

Australia's strategic circumstances, with the vast expanse of the Asia-Pacific region vulnerable to significant natural, environmental and other disasters, have pointed to the enduring utility of maintaining robust amphibious capabilities, not only for high-end war fighting, but for all the other assorted challenging tasks the armed forces are often called upon to assist with that might not necessarily be described as war-related. Indeed, experience in recent years has repeatedly demonstrated the utility of Australia maintaining afloat emergency response capabilities. In December 1974 Australia's last aircraft carrier, HMAS Melbourne, was sent to Darwin to assist with the recovery operations after cyclone Tracy.

http://www.canberratimes.com.au/federal-politics/in-war-and-peace-an-amphibious-capability-is-apt-20121021-27znj.html#ixzz2TWgQUnmu

Not surprisingly, a very good USMC-Australian working relationship is being fashioned with the new Marine Rotation Force – Darwin operating in Australia's north. This will be a good way for the Aussies to work through ways to employ their new capability.

As the Commanding Officer of the 31st MEU has put it:

VMM 265 will be chopped to us later this month. We are going to ease into the deployment much as was done with the East Coast MEUs to ensure that we execute wisely with the Ospreys.

They will be part of our training with the Australians when we participate in Talisman Saber this summer. We will be training with them as well at Bradshaw Field, which is a training area, and part of the rotational involvement of the Marines with the Australians. The training will contribute to the Australian effort to get ready to use their own forthcoming amphibious capability as well.

Second Line of Defense learned more about the Aussie transition with an opportunity to discuss the effort in May 2013 with an Aussie Army officer involved in Bold Alligator 2013. LtCol Bonavita is currently the Australian Army liaison officer with the USMC and is based at Quantico. He is finishing the final year of his three-year tour of duty in the United States. He participated last year in Bold Alligator 2012 with two other Aussie officers and in this year's exercise with one other officer.

Throughout his interview, he emphasized that the Aussies have been preparing for the introduction of their new ships, in part by working with the USMC. LtCol Bonavita said "as far as we [Australia] are concerned, the Marines are the experts on amphibious operations." Australia will look to share much information with the USMC as its Amphibious capability emerges. This is already occurring with a program of personnel exchanges and combined training.

LtCol Bonavita believes his posting to Quantico has been at the perfect time, because "as the Marines are returning to their amphibious roots, we are rediscovering ours with the introduction of our large amphibious vessels. Simultane-

ously, the Marines are establishing a presence in Darwin. These two issues have made for a busy assignment in the USA.".

He also described how the working relationship with the USMC was an important part of the development of the Australian Army itself. "We have done a lot of work with the Marines, including our officers attending USMC courses like the Expeditionary Warfare School, through to participating in exercises like Tailsman Saber, RIMPAC and Expeditionary Warrior, and exchanges with 1st Marine Expeditionary Force (MEF) in San Diego." The relationships have been enduring. LTCOL Bonavita remarked that "When I was a platoon commander, a USMC company joined our battalion in Townsville as its MEU was deployed. In my current role I have found myself working with some of the very same officers from that Marine Company who are now USMC Colonels. It's been very positive!"

LtCol Bonavita suggested that continual work with the Marines would help shape the Australian thinking about the new ships and its approach to amphibious operations. "We have a USMC Colonel attached to the Australian Army's Deployable Joint Force Headquarters within the 1st Division, which is one of the organizations leading our amphibious capability development."

He also felt that his time at the two Bold Alligator exercises, which he attended, were important in shaping his own understanding of the evolving amphibious operational capabilities.

He was asked about what he thought about the Osprey and he commented that his only negative comment about the aircraft was the limited space inside, but felt it was perfect for amphibious operations."I was surprised by the ability of the wings to fold on deck allowing a greater number of these aircraft to deploy aboard the ship. I was impressed with the redundancy of systems aboard the aircraft, which make it a very robust aircraft. I was also impressed by its speed and range as well as its ability to land just about everywhere. It really is a capable aircraft."

He was asked about what he thought was the impact of the Marines exercising in the Northern Territory.

"The decision by the Australian government to invite the Marines to operate in the Northern Territory speaks volumes about the strength and good order of the relationship between Australia and the United States."

Editor's Note: The Australian Army approach to amphibious operations and having a force structured to support them is incorpoarated in their transformation is called Plan BEERSHEBA. According to the Australian Army:

The ability to deploy offshore is crucial and Plan BEERSHEBA will tie in with existing programs to improve the Australian Defence Force's amphibious capability.

Plan BEERSHEBA introduces the Australia Defence Force's new amphibious capabilities such as the new Landing Helicopter Docks (LHD) ships which represent a fundamental shift in how Army will deploy land forces and conduct operations in response to the full spectrum of conflict scenarios in the future.

The Army's Deployable Joint Force Headquarters will foster and develop an amphibious culture across Army. To reinforce Army's commitment, the Chief of Army has designated the 2nd Battalion, the Royal Australian Regiment (2 RAR) to form the core of Army's contribution to a future amphibious force as this development work is done.During an interview with Army News, the Chief of Army explained that with new amphibious ships already in the pipeline, it's time for Army to 'make a very significant buy in.'

"What Beersheba is doing is giving the government and the ADF a wider range of options when they looks at the Army. Everything from humanitarian assistance through to warfighting, the Army can do it. The Army can get to that

operational area with the right capabilities in the right timeframe and do something about the situation when they get there," Lieutenant General Morrison said.

http://www.sldinfo.com/wp-content/uploads/2013/05/ArmyNews_120202_BEERSHEBAs-Battle-Plan.pdf

The Coming of the F-35 to Australia and Its Projected Impact on Force Structure Modernization

The F-35 Global Enterprise: Viewed from Down Under

By Robbin Laird

It is clear that the F-35 global enterprise is a unique enabler of the entire re-set of US and allied airpower.

Yet this crucial and even central reality is hardly recognized in the mounds or should one say piles of commentary on the F-35 program.

And indeed, notably in testimony of defense officials in front of Congress, is the absence of emphasis upon how central the allies are to the program, or that the F-35 has recently become the plane of choice for all of the core Pacific allies.

Allies are not simply "partners" in the program they are the enablers of 21st century air combat development and approaches.

Allies are not simply "following" the US lead; they are innovating on their own and will infuse the F-35 global enterprise with the spirit of innovation and invention, not mortgaged by the "sequestration" somnolent evident in Washington.

Notably absent from the recent 60 minutes program was a SINGLE comment on this aspect.

Yet is not just about allies buying US kit, it is about something fundamentally more profound: the reset of US and allied airpower.

Leadership is demonstrated; not assumed .

The F-35 as a global enterprise is clearly a foundational force or forcing function force for other developments.

It is not simply a means to an end (modernizing the tactical aircraft fleet) but a forcing function force for fundamental change.

There are several key aspects of the F-35 global enterprise, which are significant for allies as well as Americans.

The key to the F-35 is the reach of the fleet not the range of a single aircraft. Here the intersection of USMC F-35Bs operating off of an ARG-MEU are seen intersecting with Singapore's F-35Bs. Credit Graphic: Second LIne of Defense

First, it will be in production for a long time, which means that allies can buy with confidence that the system will be there when they need it. There will be no repeat of the Aussie F-111 problem of buying and then the USAF retiring its aircraft leaving the Aussies to foot a significant maintenance bill

The US is up and down in buying numbers of aircraft but with the coming of three production lines (Fort Worth, Cameri, Japan) the allies will be able to buy as the US goes up and down.

Although Lockheed Martin is the prime contractor, the key designers of the combat systems are among the world's best combat systems companies. As Ed Timperlake has highlighted, the combat systems have their own R and D vectors, which will drive capabilities up over time, which will be reflected in the aircraft.

The weapons, which will be fitted onto the F-35 or operated by the F-35 in a sensor shooter relationship, will be developed globally.

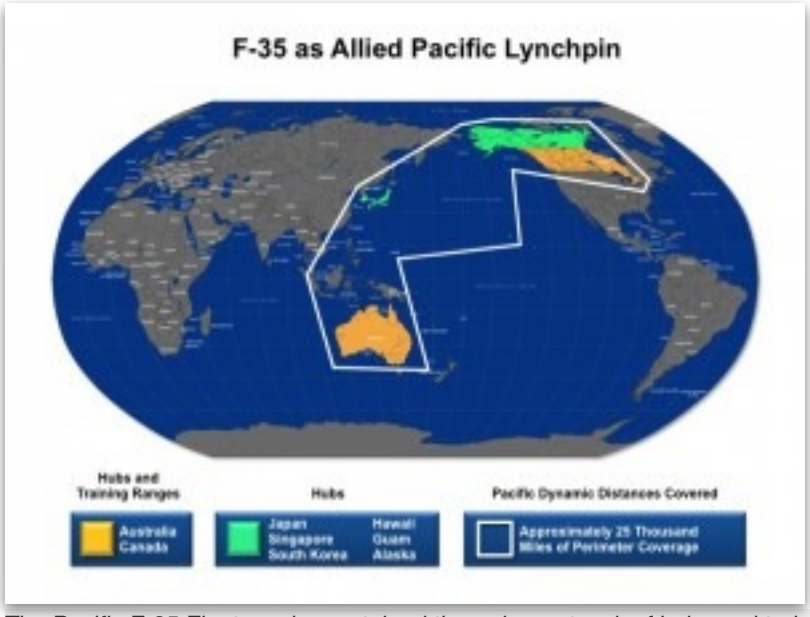
For example, the Kongsberg missile developed for Norway will be available immediately for any F-35A user. The new MBDA Meteor missile is also a case in point of allied investments also shaping a global market

This is historically unprecedented and allows global partners to build for themselves and for the global consortium.

For example, a country like Australia with unique ranges and key scientific capability (demonstrated in the hypersonics area) can become a major designer and producer of missiles for the F-35.

And as one Aussie engineer commented: "Clearly we see the opportunity inherent on adding longer range capabilities for strike associated with the F-35. And one needs to realize that the technology barriers that have hampered the development of a scramjet powered vehicle operating in the low hypersonic region have been broken."

As a software upgradeable aircraft, users reflecting collaborative combat experience will do the code rewrite. This is already happening with the Wedgetail in Australia, which is a launch point for the use of new software upgradeable aircraft.



The Pacific F-35 Fleet can be sustained through a network of hubs and training ranges. Credit Graphic: Second Line of Defense

The program has built in a global sustainment capability from the ground up, which allows for the clear possibility of shaping a very different approach to global sustainment. Programs developed first for the US which then add global customers face a significant parts and support problem because there was never a thought of building in a global sustainment approach.

The Italians have already built a regional sustainment center in Italy for Europe and Med operations.

The manufacturing program is already mature and there will three FACOS: two already exist in the US and Italy and a third to be added in Japan.

And operationally, a global fleet will provide significant opportunities for innovation by the US and its partners in building out a new combat approach around distributed operations.

And the usual comparisons of stealth China and Russian aircraft versus the F-35 ignore three crucial points:

The US and several allies are investing in the program and will use the program. As a result, it is unlikely that Russia or China will win the fifth generation investment race.

The USAF has several decades of experience with stealth, which neither the Russians nor Chinese have.

The con-ops of F-35 facilities an aerospace combat cloud and distributed operations; neither is a strong suit for authoritarian controlled air combat forces such as those of the Russians and Chinese.

In short, the reality is the reality

The opportunities are there for the new generation of I-Pad generation pilots and the 21st century air combat innovators.

The "Right Stuff" is back.

But of course you actually have to talk to the new generation of pilots, maintainers, and manufacturers of the 21st century air combat force to feel the enthusiasm and see the rethinking going on daily.

It takes time, but the enthusiasm from the new generation is palpable.

And I would add that I am writing this piece from Canberra, Australia where this week The Williams Foundation is hosting a conference on the 5th generation opportunity.

I maybe physically down under but these folks are certainly not when it comes to sorting out the future.

The Coming of the F-35 to Australia: Shaping a 21st Century Approach to Airpower

by Robbin Laird

I attended a seminar held by The Williams Foundation yesterday in Canberra, Australia.

The focus of the seminar was on Air Combat Operations: 2025 and Beyond.

The core emphasis was on the impact of the F-35 on reshaping the Australian combat approach appropriate to the challenges, which Australia faced in the region and beyond.

The emphasis was on how to leverage fifth generation technology to generate ongoing air combat development in the decades ahead.

AVM John Blackburn AO (Retd) laid on the intention of the conference in the slide seen below:

In other words, the effort put in front of a large audience of attendees, many of them from the Royal Australian Air Force (RAAF), was how to get on with it.

The RAAF started its current transformation with the coming of the C-17 which gave them a lift range, speed and capability injection. Then the introduction of the KC-30A which will be fully operational next year which introduced sustainability, reach and range, The most relevant transformational capability to the coming of the F-35 is the Wedgetail.

The Wedgetail is an air battle management aircraft, which is software upgradeable. This new aircraft will be able to manage the battlespace with 360 degree extended reach.

The Australian F-35 will enter into an environment of change and the question is how to accelerate the kind of change necessary to deal with the threats and challenges in the neighborhood and beyond in the years ahead. This was the central question addressed by the seminar.

Lt. Col. "Chip" Berke discussing his F-22 and F-35 experiences with the Australian audience at the Williams Foundation Conference, March 11, 2014. Credit Photo: SLD

At the heart of the program were three speakers: SQNLDR Matthew Harper, No. 1 Squadron, Royal Australian Air Force, Lt. Col. Chip Berke and the VMX-22 Commander Mike Orr. These three operators addressed the question of what the fifth generation experience was all about and how that experience would affect the evolution of the force in the decade ahead.

The USMC is starting its rotational engagement in Australia at the end of the month and it is clear that there is a potential opportunity inherent in the RAAF and the Aussie evolution of combat approaches with that of the modernization of the USMC approach both in the Pacific and in the MAGTF itself.

In other words, the opportunity is not just for training but shaping relevant capabilities for 21st century operations. Both Harps and Chip had something in common: the former COS of the USAF "Buzz" Mosely and Secretary Mike Wynne crated the billets for the two non-USAF pilots to fly and work with the F-22.

The benefits of that decision were evident in the seminar as these two experienced pilots could relay to the rest of us what the impact is and can be. In Chip's case, he is the only currently operational F-22 and F-35 pilot in the world.

Mike Orr's task was different: it was to look at how the USMC is building out the combat capabilities of the MAGTF with the F-35 and how the USMC is preparing for the F-35, which is being IOCd next year. To give a sense of the sense of enthusiasm conveyed to the audience by the three speakers, I have included some video inserts from their presentations.

The video insert above is from the Australian F-22 pilot, SQNLDR Matthew Harper. The two below are of Lt. Col. Berke and Col. Orr. These inserts are not the highest quality video but will convey the sense of what these three speakers conveyed to the audience.

After the seminar, I sat down briefly with Chip and Mike to discuss what they thought about their experience of the day.

It was an unusual experience, in that they were being asked by their hosts to think through the future based on their experience in dealing with the new combat systems, something, frankly, I have never experienced in an Inside the Beltway setting.

According to Orr:

I was impressed that the RAAF is engaging in a process of examining the impact of the aircraft well before we are turning wrenches and flying the aircraft. As an air force they are thinking about the strategic impact of the F-35 on their operations, and how they are going to use it as a joint and coalition enabler. There is a clear recognition of what they are getting into. They are not buying it as a one for one enabler but as a tool to do things they simply cannot do today.

Berke underscored

What I enjoyed the most about the interaction was the enthusiasm and embracing the future. This was in distinct from my experience at home where skepticism and resistance to change is so constant. The RAAF clearly is embracing the future and are enthusiastic about the coming of the F-35 as a key enabler of the future.There is no question of should we: it is how do we.There is a full embracement of the necessity for the aircraft and how to get on with its transformational role and impact.

A RAAF F-22 Pilot Explains the Dramatic Shift to Fifth Generation

During the Williams Foundation seminar held in March 11, 2014 in Canberra, the RAAF's exchange pilot who became a proficient F-22 pilot, SQNLDR Matthew Harper, No. 1 Squadron, explained what it was like to become a 5th generation pilot.

Not surprisingly, Harper has an impressive background.

He has over 2000 hours flying fighters (including the F-22, the F-18F and F-18A). He is an RAAF Fighter Combat Instructor; he has worked on F-18F tactics development; ACG tactics development; he is an F-18F FC Course Designer and Director; he is worked on JSF/NACC interaction and is currently the XO of 1st Squadron at RAAF Amberley.

His fifth generation experience is equally impressive. He has nearly four years flying the F-22A. He was an F-22 mission commander, an F-22A instructor pilot and an F-22A SEFE.

He became an F-22 pilot because of the decision of the then COS of the USAF ("Buzz" Mosley) and the then Secretary of the USAF (Mike Wynne) to put other service and coalition partners into F-22 squadrons to learn what the leap to 5th generation was all about.

And a leap it is.

The term 4th to 5th generation suggests a gradual step grade function, much like the evolution of airpower over the past 50 years.

Fifth generation is not a step grade; it is a leap into a whole new way of doing air combat and combat operations.

Harper went out of his way to describe the "unlearning" process that is necessary from operating his Super Hornet to flying the F-22.

Buying fourth generation aircraft is not a holding pattern for the future; it is being left behind in a different historical epoch.

It is about as dramatic as doing cavalry charges with horses and Blitzkrieg warfare; something that did not work out very well for Poland in 1939.

For Harper, the systems in the fifth generation aircraft, which take a giant leap forward with the F-35, provide the pilot with a decision making role, not an overburdened "look at your screens" and sort out what to do role.

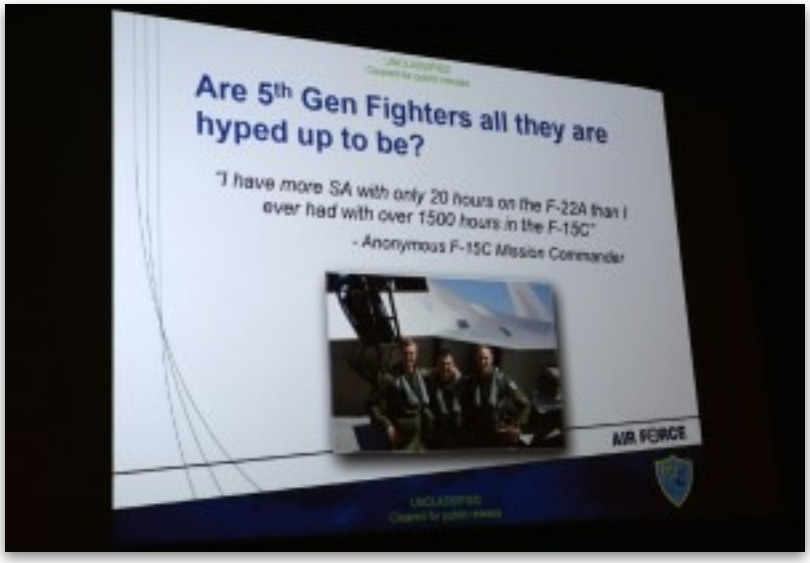
He summarized the impact that he saw with three key examples:

First, within the first 30 minutes of sitting down in the simulator, he grasped that his ability to dominate the air space with the F-22 was clear.

Second, the abilities of the pilots are significantly augmented with fifth generation capabilities. He cited a recent example where a USAF pilot with only 350 total flight hours flew in Red Flag and dominated his airspace. For Harper, this would be virtually impossible to imagine in any other plane.

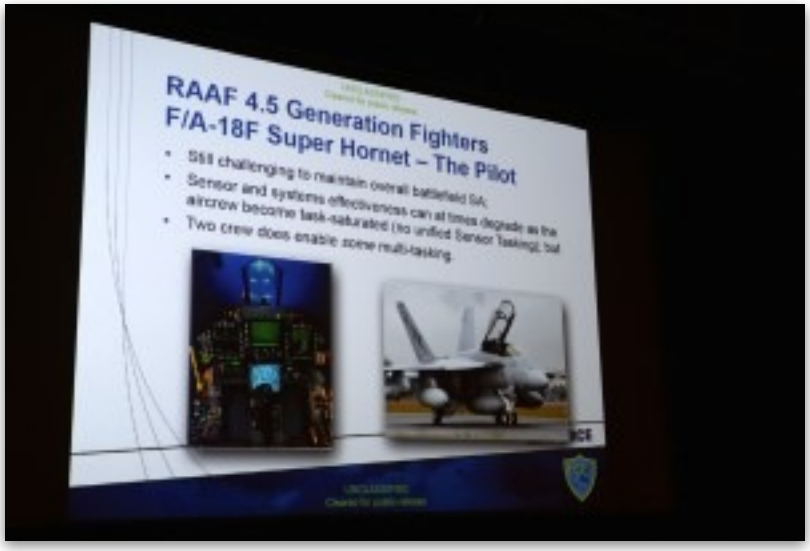
Third, he cited the experience of a USAF F-15C pilot who told him:

"I have more SA with only 20 hours on the F-22A than I ever had with over 1500 hours on the F-15C."



The overarching point of the presentation was that the fifth generation experience was about disruptive change, not evolution. You needed to get into the fifth generation platform to experience the change and learn how to shape tactics and concepts of operations relevant to 21st century operations, rather than perfecting your 20th century piloting skills.

He went out of his way to compare the Super Hornet to the F-22A with a core focus on how the former was NO WAY the later. Whereas the F-22A was an SA and information dominance machine, the Super Hornet was a classic aircraft which had the limitations of any airplane not built from the ground up to be an information dominance aircraft for the 21st century battlespace.



While the Super Hornet is a significant upgrade from the Hornet, it is not and never will be able to deliver what a fifth generation aircraft can deliver: integrated data fusion and re-shaping the pilot and squadron roles in prosecuting air dominance and support to the joint force in the battlespace.

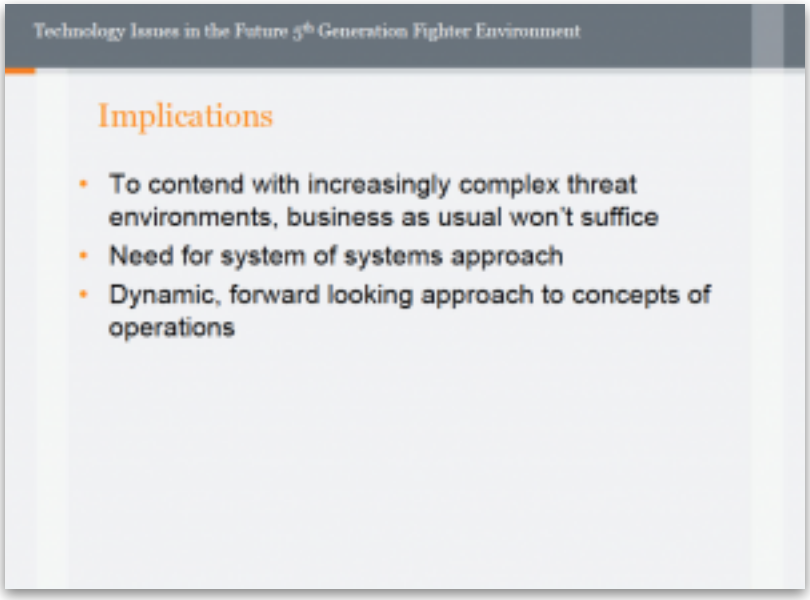
In short, the leap ahead is crucial; and reworking the culture of the RAAF will be necessary to leverage the disruptive technology built into fifth generation aircraft.

Preparing for the F-35: An Aussie Perspective

Recently, the Williams Foundation in Australia held a seminar in Canberra on the future of air combat.

In particular, the seminar focused on the impact of fifth generation technologies and was built around a central set of presentations by operators of the impact of fifth generation aircraft on the evolution of combat operations.

SQNLDR Matthew Harper, No. 1 Squadron, Royal Australian Air Force, Lt. Col. Chip Berke and the VMX-22 Commander Mike Orr. These three operators addressed the question of what the fifth generation experience was all about and how that experience would affect the evolution of the force in the decade ahead.



In the presentation immediately prior to the pilots, Mr. Peter Hunter, from the Australian MOD provided a perspective on fifth generational technology as seen from Australia.

The full presentation can be found on the Williams Foundation website, but some of the key highlights are presented here.

Hunter underscored that within the Pacific region, obviously threats are going up, and threats of the sort that will require an ability to operate rapidly and within difficult combat areas, and the fifth generation is not a nice to have but a sine qua non for operations.

In a later presentation, a senior Royal Australian Air Force (RAAF) officer highlighted the importance of F-35 with Aegis integration to deal with various missile threats, including those involving some nuclear assets.

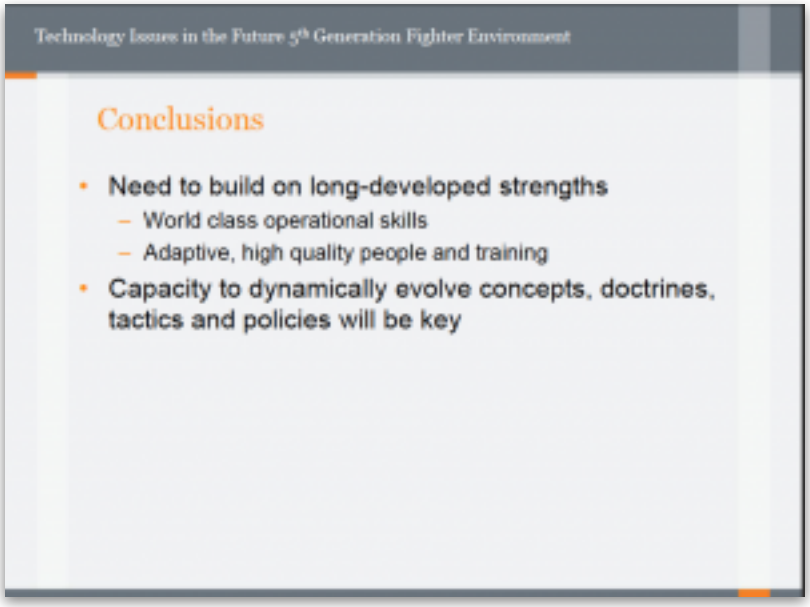
Hunter viewed fifth generation aircraft a key element of dealing with evolving threats in the region.

Notably, it is the integrated combat systems of the fifth generation aircraft wrapped into a stealth platform, which is the centerpiece of the capability, but the ability to deploy a fleet of such aircraft able to conduct secure communications which was the key enabler of a joint force.

Hunter clearly focused on the no platform fights alone approach in discussing how fifth generation aircraft enabled the overall joint force to prevail.

He placed a central emphasis on the radical changes which data fusion can bring to the combat air fleet.

The data fusion systems of the F-35 are viewed as key enablers for battlespace dominance, a dominance which has already has seen as one in a Red Flag exercise commented that his plane was "destroyed" by an F-22 that "we never saw, never knew was there, and we had no idea where the strike came from that destroyed us."



A key emphasis throughout was that true fifth generation aircraft is not about a sleek flying machine: it is about integrated combat systems, data fusion and the ability to share and push out the data which allows for information dominance.

He started and ended with a core message: it is not just about technology; it is about mastering the cultural revolution associated with fifth generation technology.

"Success will be dependent upon how innovative we are in leveraging the technology of the fifth generation aircraft and their combat systems as upon the performance of the technology itself."

He then added "the RAAF has several core competencies, which such allow us to master the new technologies. We need to build upon our world class operational skills and our adaptive, high quality people and training."

Just having the equipment is not enough. He highlighted this point by talking about aircraft carriers.

"You can buy an aircraft carriers but this does not mean that this will be an effective combat system. This requires many skill sets, training, history and operational skills beyond simply building or buying a platform."

For a 2011 article on the F-35 and culture change see the following:

http://www.defensenews.com/article/20110221/DEFFEAT05/102210314/Embrace-Air-Power-Revolution

F-35 Lighting II Arrives at Luke AFB: And the Aussies Prepare to Come

Looking at two separate news stories, we can see both the arrival of the F-35A at Luke AFB in Arizona and the RAAF preparing to come and train at the base.

Excerpts from Article By Paul Giblin

The Republic

Mon Mar 10, 2014 11:55 PM

Air Force test pilot Roderick Cregier flew several slow, low loops through the Arizona sky before landing Luke Air Force Base's first F-35A Lightning II stealth fighter jet Monday, launching a new era for Glendale's 72-year-old installation.

A group of about 250 Luke airmen, family members, civilian employees and veterans applauded as Col. Cregier shut down the jet's thundering engine and popped its canopy.

"This is a day that has been a long time in coming," said Col. John Hanna, who oversees flight operations at Luke as commander of the 56th Operations Group.

"It's the result of many years of hard work by countless people in the military and in the community," Hanna said during a news conference alongside the base's runway.

The matte-gray plane with tail No. LF5030 is the first of what is expected to be 144 of the supersonic jets assigned to the base during the next decade.

Luke officials expect additional F-35s to arrive a couple of times a month until the base has six squadrons of 24 planes each. They anticipate receiving about 15 more F-35s during the rest of 2014.

Luke is projected to become the Air Force's primary F-35 pilot-training base and the largest F-35 base worldwide. U.S. pilots and foreign pilots alike will train there before deploying to combat units worldwide.

"We have four qualified F-35 pilots right now stationed here at Luke Air Force Base, so us receiving aircraft means that we get to start flying these aircraft, which is very important for our fighter pilots," said Lt. Col. Michael "Jeb" Ebner, commander of the 61st Fighter Squadron, Luke's first F-35 unit…..

Most of the 136 F-16 Fighting Falcons currently at Luke will be reassigned to Holloman Air Force Base in New Mexico as new F-35s arrive at Luke. The first two F-16 squads are set to transfer this year and next.

Only 26 F-16s are expected to remain at Luke after all of the F-35s arrive…

And the significance of this landing has been noted Down Under:

AY hello to Top Gun 5.0. Veteran fighter pilots Andrew Jackson and David Bell are the two men at the tip of the spear as the RAAF shifts towards its next-generation combat aircraft, the F-35 Joint Strike Fighter.

The two Squadron Leaders, based at RAAF base Williamtown near Newcastle, will be the first Australians to fly the multi-billion dollar machine, billed as the most tech-heavy fighter plane on the planet.

Squadron Leader Andrew Jackson and Squadron Leader David Bell have been selected to be the first RAAF pilots to fly the F-35 fighter jets. Picture: Craig Greenhill Source: News Corp Australia

They will spend four years at Luke Air Force Base in Phoenix, Arizona, first learning how to fly the fifth-generation fighters.

They will then instruct other Aussie pilots as they filter through in the lead-up to the F-35's gradual deployment here from 2018.

Listen to defence chiefs talk excitedly about the new aircraft and it would be easy to think they were discussing a new computer or mobile phone, not a war-fighting machine.

But that, according to Air Vice- Marshal Kym Osley, the RAAF's head of capability transition, is just the point.

"Look at it like this: the F-111 was a landline; a telephone connected to the system made out of black plastic," he said.

"The F/A-18 is a huge brick mobile phone, but the F-35 is like the latest iPhone."

This iPhone can drop bombs, evade enemies using stealth technology and "sees" the battlefield in real-time below, stretching out for hundreds of kilometres in any direction. Sqn Ldr Bell, 34, saw it as "a game-changer".

"We're going to have to adapt the way we think about air combat to be able to utilise the F-35 to its full potential," he said.

"To get in on the ground floor and be one of the first guys to start doing that is a real privilege."

AVM Osley said the new machine would trigger a "generational change" in the way the RAAF approached air combat….

Excerpted from Neil Keene, "Top Gun Veterans Learn to Fly RAAF's F-35 Joint Strike Fighters, Daily Telegraph (March 12, 2014).

http://www.dailytelegraph.com.au/news/nsw/top-gun-veterans-learn-to-fly-raafs-f35-joint-strike-fighters/story-fni0cx12-1226851789114

The Coming Impact of the F-35 on RAAF Modernization: Transformation by a Battle Hardened Force

by Robbin Laird

After The Williams Foundation seminar, I sat down to discuss with one of the organizers of the seminar, Vice Air Marshall (Retired) John Blackburn his take on the questions, which posed to the seminar and how he thought those answers, were generated.

The core questions, which guided the seminar, can be seen in the slide below:

Question: You helped set up and host a conference at The Williams Foundation, which focused on the evolution of airpower in the decade ahead.

The RAAF is in the throes of a modernization process – C-17s, KC-30As, Wedgetail and F-35s. Could you talk about the goals of the conference and the way ahead for the RAAF?

Blackburn: What we sought to do was to open up people's minds to the potential impact of the JSF as a transforming capability.

It's a trigger for change.

There is a risk in a lot of organizations and in a lot of places of people thinking about this airplane is to replace a previous generation of airplanes. It is not.

What we're trying to do is get people to understand that it's not just the airplane. It's the total system. It's the transformation of the CONOPS capability.

It networks and links in far different way from many other previous generations, and it will enhance our existing fourth generation capabilities.

We are looking at integration across the force with platforms like the Super Hornets, the 4.5 generation, the Classic Hornets, but also our Wedgetail capability, our AEW&C platform which – frankly – is leading edge technology and software upgradable unlike any our other previous platforms.

In other words, the combination of JSF with its transforming capability with Wedgetail, which is a significantly changed capability from the past, and our legacy capabilities gives us the opportunity to actually transform our force rather than just evolve it.

Question: The RAAF Wedgetail squadron is already living the experience of operating a 21st century system with software upgradeable built in. This puts Australia on the cutting edge. How will this play into the coming of the F-35 in Australia?

Blackburn: I think what it does is it changes people's mentality or approach.

In the old days you had to wait for almost a midlife upgrade.

You would operate it past 10 years. There'd be a lot of process and paperwork for midlife upgrade.

And with the Hornet, we did that

This is a different model now where we can use the software upgrade capability of these platforms and continually evolve them in concert with other capabilities.

It is not just upgrading something within the Wedgetail. Now we can focus on how we're going to achieve an outcome.

And instead of waiting five years for the next upgrade, you get an idea, you can insert that into a software upgrade program.

In a simple sense, it is analogous with the iPhone. That next IOS that comes after the iPhone could significantly change the functionality of the particular platform.

It is the ability as well rapidly to adopt change and take advantage of not only the capabilities of one platform but multiple capabilities as well and this new approach is going to change our approach to combat.

Question: The operators of the F-22s and F-35s coupled with Col. Orr's focus on the integration of fifth generation capabilities within the USMC total force concept of the MAGTF really was a highlight of the conference. They drove home the point that even that is a fifth generation aircraft, it is not simply a replacement for the past generation of combat aircraft, but part of a whole pattern of change in combat approaches. Does this make sense as the core point really of the conference?

John retired from the Royal Australian Air Force in 2008 as the Deputy Chief of the Air Force following a career as an F/A-18 fighter pilot, test pilot and strategic planner. His senior posts included Commander of the Integrated Area Defence System (IADS) located in Malaysia, commanding a multi-national headquarters established to effect the Five Power Defence Arrangements (FPDA), and Head of Strategic Policy in the Defence Headquarters.

Blackburn: Absolutely.

The message you got from those operators was this is not just to replace an airplane. This is a change in thinking. It's a change in approach to operations.

The lessons that these young guys brought back out of it was striking because they were talking to an audience of operators, as well as, as a range of defense people in general.

The fact that the operators could get out there and say, this is what we learned from this experience. It's not just we're replacing our planes. It's a change of thinking. It's a change of doing things.

But also there is the opportunity by working not only within the RAAF context but with the Marines and other parts of the U.S. Forces, we can evolve and transform how we fight because we are jointly enabled by the JSF, fifth generation capability or the F-22.

That was the exciting part.

So we're not listening to a company representative tell us that this is the best thing they've built. We're not listening to sales people.

We're listening to operators who've been through an experience that had fundamentally affected them. They get it. They're driving change at their level.

So what we're very keen in seminars to tell the audience of Air Force and people who are in there and the defense folks, it's the opportunity they will have to take these capabilities, look at different ways to innovate and work with them. That is the exciting piece.

We don't have to wait for a company to deliver the next upgrade. It's how the operators use it and how they innovate it is going to make the difference.

Question: There were many younger officers from the RAAF in the audience. What do you think the message received was by these officers?

Blackburn: It is clearly a plane for their generation.

Leadership in this era of technological change is not about controlling from the top and directing everything.

It's about enabling an environment of innovation and you let those younger generations experiment and develop and you give them the best space to work.

The older generation has a very important role. Experience is something that's very hard won. You've got to guide mentally, these folks.

But what you can't do is constrain them.

You set a vector where we're trying to head and say, "Folks, go and have a look at this. You innovate. You think about what's different here. You do it."

However, throughout that process, don't forget the experience is hard won. Let's help them do that. Guide them. Don't let them fall off the edge.

But give them a fair bit of free rein to try and do it. If we do that, that's where our Western forces will maintain not only a technology edge but also a capability edge because it's that ability to innovate very rapidly, to work out very different ways of doing things that our next generations will bring to the fight.

Question: The RAAF has significant combat experience in the past decade. How does this affect the innovation process?

Blackburn: And one of the, the clear implications talking to the RAAF is this is a battle-hardened force. These are people who have gone through war, multiple wars and are bringing that combat experience to the definition what to do with the aircraft.

In the past, we didn't have a very broad depth in recent generations of combat experience. That's changed in the last 10 years.

Our Australian Defense Forces have been in operations, significant operations. And now we have a much better way to relate to the U.S. Forces who have also been on an extended pace of high tempo operations.

Having the Marines come onboard in Australia is important as well. It's really good to see how a truly a joint force is doing its job.

One of the challenges we'll face in Australia is making sure that the Army, Air Force, and Navy work together in an even more integrated way to produce a better combat outcome.

And it's one of the key challenges for the Air Force is going to be to communicate that the JSF it's not just a shiny expensive airplane.

This is a transformation point, a trigger.

It can change the way not on the Air Force works but all the three services work together.

The Marines are a great example of working the different elements of a joint force.

The Industrial Dimension

The Business Model of Thales Australia: Transfer Technology, Grow Indigenously, and Export Globally

By Robbin Laird

Earlier I wrote about the role of European firms in the augmentation of allied Pacific defense capabilities.

In American discussions of the re-shaping of Pacific defense, naturally the primary focus is upon the American role and contribution. Lost in such a focus often is how the Asian allies are shaping their defense and security futures and shaping those futures in part by building upon evolving European systems.

European defense industry plays a growing role in Asian defense and security.

And they are doing so by offering core products of interest in the region and being congruent with core demands of the 21st century Asian customers.

The larger Asian customers clearly wish to expand their capabilities to produce their "own" equipment. What this means in a global age is that industrial partnerships between European and Asian firms are a key part of the growing European presence. This means as well that "re-export" of European systems from Asia will be part of the 21st century reality of the global market.

During my visit to Australia in early March 2014, I had a chance to talk with the CEO of Thales Australia, Chris Jenkins. We focused on the Thales engagement in Australia and highlighted the Thales business model in the country.

Thales, Australia produces the simulator for the Wedgetail system. This is the first software upgradeable combat aircraft of the 21st century generation of AE and W aircraft. Credit: Thales, Australia.

The basic dynamic for Thales in Australia has been as follows: transfer of technology from Europe to Australia, the shaping of indigenous capabilities which grow the ability to support and upgrade the product, and the export FROM Australia of maturing products into the global market served by Thales, with Thales providing a global support framework within which to insert exports from Australia.

According to the Thales website, Jenkins has a long history of working in Australia and with Department of Defence there.

Chris Jenkins is a defense industry leader, a passionate believer in local skills, and a strong advocate for Australian manufacturing.

He has held senior roles in Thales locally and internationally for over 17 years, playing a crucial role in transforming the company from five separate businesses into one of Australia's largest suppliers of mission critical products and services.

His appointment as Thales Australia CEO in January 2008 followed two years as Vice President Operations, and before that three years as CEO of a Thales consortium in the Netherlands, delivering that country's national public transport smartcard program.

Prior to this, Chris was Managing Director of Thales Underwater Systems in Australia from 1999 to 2003. He previously held senior marketing, sales and project director roles in the business, and was also a key player in its creation as a Thales/GEC joint venture in 1996.

Chris started in the defense industry as a mechanical engineer with Racal in 1981, Plessey in 1983, and then GEC Marconi in 1990 heading up its Underwater Systems business in Australia.

Chris is currently Chairman of the Board of Directors for the International Centre for Complex Project Management and Chairman of the AIG Defence Council. He is also a member of the AIG NSW Executive and the AIG National Executive.

He was a member of the Prime Minister's Manufacturing Taskforce and is a member of the Manufacturing Leaders Group.

In the discussion with Jenkins, he highlighted the sonar business as an example of the Thales approach in Australia.The business started with the transfer of French technology to Australia in the early 1980s. The technology was used by the Australians to support their submarine program, and as the sonar systems were integrated into Aussie platforms, a team was created to support the technology, which basically meant, an ability to upgrade the system and to develop intellectual property along the way to shape the course of the modernization of the capability.

As indigenous capability was forged, the evolving technology was Australian and available for export, and has been done so in the UK Astute submarine program as well as in support of oil and gas platform support systems.

Thales started with a small team of French engineers working in Australia to transfer sonar technology and by the 1990s had nearly 500 people, mostly Australians, working on the program and exporting from Australia.

As Jenkins put it:

Australia is a long way away from major defense industrial centers in the West.

This means that indigenous support is crucial to the effectiveness of any program sold and then developed within Australia.

It is not just a 'nice to have' capability; it is crucial to the success of any technology imported into Australia.

This means as well that implanting the technology and supporting it leads to the real possibility of further development of the technology for global export.

We generate local engineering expertise through transfer of knowledge in the country. Then we generate the right solutions and agile responses to the nation's evolving needs.

In the sonar related business areas, according to Jenkins, Thales has exported $300 million (Australian) dollars worth of sonar systems and $150 million (Australian) dollars worth of mine sweeping equipment.

Thales produces world class acoustic sweeps in Australia. Photo Credit: Thales, Australia

This has meant that the further development of Australian-based sonar systems is paid for in part by exports and not simply by Australian defense programs.

According to Jenkins:

If you look at our sonar transducers, we've exported them to France for a wide variety of applications. Our mine-hunting sonars are exported into the wider Thales organization both into the UK and France. The mine-sweeping gear we jointly developed with the Defence Science and Technology Organisation (DSTO). We have a very close and important knowledge relationship with the DTSO.

And we have sold the minesweeping systems to a number of navies, including the US Navy, and the UK, South Korean and Japanese navies.

A very large number of navies have bought our minesweeping gear. It's quite a breakthrough technology.

Jenkins focused throughout the interview on the importance of the sustainment of a product. By sustainment, he meant both maintainability and upgradeability of the product.

Background on Quickstep Holdings Limited

Quickstep Holdings (ASX:QHL) is a manufacturer of advanced carbon fibre composites for the aerospace and defence and automotive industries. The company operates state-of-the-art manufacturing facilities at Bankstown Airport in Sydney, Australia, and has offices in Germany and the United States.

Quickstep is an approved supplier for the international F-35 Lightning II Joint Strike Fighter (JSF) program - the largest military aerospace program in the world, valued at in excess of U.S. $300 billion worldwide. To date more than 90 JSF aircraft have been delivered to the U.S. Department of Defence, and this number is now expected to grow rapidly. The company has also been selected by Lockheed Martin as the sole supplier of composite wing flaps for the C-130J Super Hercules military transport aircraft. Quickstep is currently partnering with some of the world's largest aerospace/defence organisations, including the U.S. Department of Defense, Lockheed Martin, Northrop Grumman, Airbus and EADS.

Quickstep is also developing patented manufacturing technologies to produce high-volume A-grade finished composite components for automotives and specialist thick parts such as spars and wing skins for large defence and commercial aircraft. The company is currently working with the US Department of Defence to qualify its patented Quickstep Process and Resin Spray Technology (RST) for JSF, and is also conducting a major research and development program with car maker Audi aimed at delivering high-quality finish, low cost, fast processing of carbon fibre composite, together with specialised resins, particularly adapted to the automotive industry.

"It is about keeping the technology at the level the end user needs to meet whatever challenges the platform is meeting in its operational life."

Thales has designed the next generation vehicle in Australian protected mobility vehicles. Meeting the needs of a defense force constantly challenged by Improvised Explosive Devices, mines or small arms ambushes, its our aim to provide a highly mobile, light protected vehicle to meet today's and tomorrow's operational needs. Credit Text and Photo: Thales, Australia

He underscored that the approach taken with regard to sonars has been followed in other business areas in Australia, such as air traffic management, protected mobility vehicles and simulation.

He discussed as well the vehicles area as one where Thales has played a significant role for the Australian Army.

The Bushmaster vehicle was designed in Australia, and we worked with the Australian Army to evolve the system over time as needs were identified.

We have exported a number of these vehicles to the Netherlands and Jamaica, and are currently pursuing other export opportunities.

Jenkins highlighted the basic approach being followed by the company in Australia as follows:

Thales was one of the first international investors to really embrace the idea of intellectual property exchange into Australia, with the expertise then further developed through training within Australia itself.

We built upon this approach with the acquisition of ADI Limited, which gave the company an important offering into Australian defense.

We concluded the discussion by focusing on the emergent role of unmanned maritime vehicles in the mine sweeping mission.

We see the emergence of robotic vehicles at sea as a key element of the changing business area for mine sweeping technologies, and are positioning ourselves to be in the forefront of the relevant technologies.

On the Thales portfolio in Australia see the following:

https://www.thalesgroup.com/en/homepage/australia

An Interview with the CEO of Quickstep: An Australian F-35 Global Supplier

By Robbin Laird

During my visit to Australia in early March, I had a chance to talk with some of the F-35 suppliers in Australia.

When one frames this subject, the term "suppliers" to a nation's F-35 program suggests a legacy approach, whereby one is assembling an aircraft in country and for the life of that engagement one is supplying parts for that single nation's aircraft.

This would mean for Australia, that a relatively small number of aircraft would be produced, and supply and support houses would then engage in the production or assembly of those aircraft, and when that production run or acquisition run was over, that would be it except for whatever role the supplier might have in maintaining the aircraft.

The F-35 program has a very different approach.

It is designed for a long-term production cycle for the engagement of a network of global suppliers, and participants in the program and rather than producing simply for their own nation's planes but for the global production run and sustainment effort.

This means as well that there is the possibility of having multiple suppliers for the aircraft, which ensures that competition is built into the supply chain driving down cost, and raising reliability rates on parts to be supplied to the aircraft over time. This means that the type of companies you can attract to the program see the point of investing in

the program for the long haul; and these are clearly going to be among the best suppliers, and more than willing to meet the competition globally.

In turn, the long production run of the aircraft allows a company to wish to participate and to invest because planning can be for the longer term and not just a decade or less engagement in a smaller or mid-size nation's acquisition cycle.

Such a company is the Australian company, Quickstep Holdings Limited, the manufacturer of high-grade carbon fiber components. In a discussion with the CEO, Philippe Odouard, the company and its approach to the F-35 program was the focus of attention.

Question: What is your background?

Odouard: I have been in Australia for more than 30 years. I came to Australia with Sagem and then moved to what is now Thales and had an opportunity to work with a new Australian startup, which is now Quickstep. The founder of the company had developed some very innovative solutions for composite manufacturing, and the innovative business climate in Australia has allowed the company to grow. We are focused on global exports and currently have state of the art manufacturing facilities at Bankstown Airport in Sydney and have offices in Germany and the United States.

The F-35 Program Executive Officer U.S. Air Force Lt. Gen. Chris Bogdan met with employees and management of Quickstep Holdings Limited at their manufacturing facility in Bankstown Airport where high-grade carbon-fibre components are produced for the F-35. He was impressed with Quickstep's manufacturing processes and technology, they appear to be world class," said Lt. Gen. Bogdan. "The technologies I saw have great potential to improve aerodynamic performance and help to keep manufacturing costs down. Quickstep's contributions to the F-35 program are highly valued today and will be for years to come."

Question: What is the approach of the company to the market?

Odouard: We are involved in the F-35 program as well as working with Lockheed Martin on the C-130J as well as with Boeing, Airbus, and Sikorsky.

But we are not just involved with aerospace.

We see the future for composites in the automobile manufacturing sector as a significant growth industry. To meet the mandated environmental standards, which are getting more stringent in many countries, the weight of vehicles

needs to be reduced along with shaping new propulsion plant technologies. Composite manufacturing is clearly a key element of building capabilities to reduce vehicle weight.

The military market is important for us because we are a first world developer and producer. The military market demands high end products with significant reliability built in. This is an area where a high end producer can have an advantage over the lower cost countries like China.

Question: How do you see the F-35 program and its impact on your company?

Odouard: We see the program as the military equivalent of a civilian aerospace program such as the A320 or the Boeing 737. It is a program with a long production run and global reach and allows us to engage in a global production engagement.

With the F-35 program, we are supplying key composite elements to Northrop Grumman, which is the major producer of the fuselage, and whose new plant is a state of the art automated manufacturing facility.

A measure of the recognition we receive from Northrop is that the President of Northrop Grumman Aerospace Systems came to Australia for the opening of our new facility in Bankstown, Australia.

http://investor.northropgrumman.com/phoenix.zhtml?c=112386&p=irol-newsArticle&id=1707643

Indeed, during the opening ceremonies we had a video link back to Los Angeles where the Northrop team participated virtually in the opening which symbolizes the approach of working closely together to deliver reliable parts.

In fact, we compete within the supply chain to provide high quality parts and have been consistently recognized by Northrop to be at the head of the class.

Question: Why Australia for your company?

Odouard: The simple answer is that the inventor of the technology was Australian. We moved from Perth to Sydney to facilitate the upsurge in production for the global market.

The Australian government in its approach to defense products recognizes that it does not have a large domestic infrastructure for defense production and is looking for companies that can position themselves for a global engagement. The approach is to amortize cost by not simply building up a domestic industry, which needs to be fed by domestic acquisition, but rather one that can work effectively abroad and help the Australian government amortize the cost of its core acquisitions.

The business model is very different here from what Brazil has done with SAAB. After the Gripen acquisition is over it is over. You are not going to get exports and your growth abilities are limited.

In the F-35 case, our investment allows us to participate in a global supply chain for a global aircraft. It also allows you to shape a core team of developers and manufacturers and to take that core team into the global marketplace and to operate in adjacent fields as well. The investment in the F-35 engagement is a real trigger to value from the Australian government's point of view. It is not a dead end street.

Recently, the head of the F-35 program came to our facility and was pleased to see our efforts at shaping new approaches to production and to affordability driven by technological innovations. We believe that the global competitiveness built into the program will be a real benefit both for us and for the program.

Editor's Note: The Quickstep website is a good guide to the approach of the company and its global engagement.

http://www.quickstep.com.au/

Ferra Engineering in Aerospace and Defense: An Australian F-35 Global Supplier

By Robbin Laird

Ferra engineering is an international company based in Australia, which engages in the design, manufacture and delivery of advanced aerospace/defense components and systems for a number of well-known manufacturers. The company is an Australian based supplier for the F-35 as a global program, and as such, brings its expertise to the program, and at the same time benefits from the global nature of the program.

During my visit to Australia in March 2014, I had a chance to interview Mark Scherer, CEO of Ferra Engineering and a winner of EY Entrepreneur of the Year Award as well.

The company provides high value engineering products to the commercial and defense sector for a number of global companies. It has a balanced portfolio between commercial and defense and with the company's location close to Asia has viewed first hand the competitive pressures for commercial technological development. These lessons are being applied to the defense sector as well.

Australia has developed firms in the technology sector, which are capable of being globally competitive, and the relative small size of the population of the country, if you cannot be, you probably cannot exist. Australian companies to the F-35 program bring this spirit and experience of global competitiveness.

Notably lacking in public discussions of the F-35 program Inside the Beltway is an understanding that the global sourcing brings with it both high quality and high value suppliers which will drive up reliability and drive down cost.

Perhaps next time on 60 minutes they might mention the global nature of the program and the competitive capabilities built into the program by building a global supply chain early in the program.

Question: How would you describe the basic activity of your company?

Mark Scherer: We're basically engaged in civil and military aerospace. We provide mechanical subassemblies ranging anything from airframe structures to pylons, or adaptors. Although we do some machining, but our focus is on producing value-add through components which we assemble, test, and then actually sending it to the customer quite often directly onto the production line. We are not just producing parts we are providing assembled packages to the final manufacturer.

Question: Why Australia in terms of high quality global manufacturing?

Mark Scherer: There is a culture of innovation here. Our companies tend to be smaller than global competitors and more agile. We are not afraid to test things, and I think that's, that's an advantage. We have to be a bit keener than some of the larger companies, say in the States or in Europe who traditionally are much closer geographically to the OEMs than we are.

Australia also has some cutting edge technologies in some key areas.

Australia has been quite good in looking for better technologies to manufacture things more cost effectively.

One example is in titanium machining. We are using a laser in front of the machining to bring the temperature up and bring it to a stage where you actually can double your feeds and speeds without any extra additional cost. We developed that technology together with Commonwealth Scientific and Industrial Research Organisation (CSIRO).

This process cuts some of the machining costs in half.

CSIRO is now commercializing that technology, so they're working now with machine tool builders to bring to a broader market. We have been machining with lasers now for three years.

Question: Being close to Asia must also create some first hand knowledge about the need and approaches to drive down costs as well.

Mark Scherer: It does.

I would say Australia being so close to Asia especially on the civil side, we're very exposed to what a cost structure, what's the capability in this region is.

And I would say with regard to civil aerospace or the automotive sector, Australia needs to be really able to work with Asia and come up with the technology where we can compete with the Asian cost structure. If you can't do it process by process, you have to do it with technology. So we are very exposed to lower cost competition and how best to compete with technology.

I basically spend a lot of time in Asia, and I come from the civil side of aeronatucis and the automotive industry. About 15 years ago, I was looking at factories and plants, which were charging out $1 an hour fully, loaded rate. When you work with system like that, it definitely becomes very ingrained that there is a complete shift on in our approaches to remain competitive. We are not in Europe and hoping to wish away the challenge.

Question: What programs are you involved in with civil and military aerospace other than F-35?

Mark Scherer: We are involved with several different programs. Half of our production is for civil programs, directly for Boeing on programs like 737, 747 and 777. We produce for Airbus by providing finished materials to Parker Aerospace and we provide materials for the P-8 program, the Tiger, and NH-90 as well to mention a few.

With regard to the Tiger helicopter we provide the pilot controls – the gear stick, the rotor pedals and the various parts that allow the pilot to control the helicopter – to Tiger assembly sites in France, Germany and Spain.

Question: Now let us turn to the F-35 program and your involvement in and perspective on the program. What are you providing for the F-35 and how does it fit into your basic approach to the future?

Mark Scherer: We produce weapon adapters for the aircraft. When we started there was a limited supply chain capability in country. We had had to ship our components to the US for heat treatment, service treatment and our hardware was shipped to us from the US. This drove up cost.

But because it is a long-term program, we managed to get local people onboard to up skill them and to allow us to produce more content locally and to become more cost effectively. We now have over 20 local companies, which are now producing for use, and we can do a whole complex structure from start to finish in Australia, which drives up quality and drives down cost.

Question: And the F-35 program provides a catalyst for other investments and capability developments as well?

Mark Scherer: It does.

Traditional programs may go three or four years, so if capability is missing of your supplier, it's quite often that's not enough for the supplier to invest in a complete capability.

But because we take a long-term view and because some of the governments were also keen on up skilling, it allowed us really to promote the same capability as well for other programs.

For example, the same supply chain that we use in F-35, can also do, say, the Blackhawk pylons that we supply half of the global fleet for. We had the flow on effect.

The capability we established then had flow on effect into other programs.

Question: And the consequences for the F-35 program?

Mark Scherer: I think Lockheed is depending very much on the global supply chain approach to bring both continuous innovations and cost reductions to the program.

Indeed, this is really an important element of the program – its global sourcing and the opportunity for a company like mine to get engaged in the program and bring what we believe are unique capabilities to the program and to learn along with the program as well.

Recently, I had the, the opportunity to talk to General Bogdan, and he basically said that the program is in great shape, the F-35 program.

He emphasized that industry really need to keep driving the cost down and he said as long as we can keep going down the cost curve, volume will come through. The volume needs to go up to achieve the target costs but it's a bit of the chicken and egg.

I think that's the way Australia has demonstrated and Mr. Bogdan said that actually he has seen Australian industry with some really good innovative technology, which is now flowing in to the F-35 program.

And I think that's something that Australia is good at. We are quite good at adopting new ways, innovative ways and quickly adopting them.

And it is not just about cost; it is about cost effective technological adaptation over the life of the F-35 program and we think we can really contribute to this effort within our areas of competence.

Editor's Note: The following is taken from the Ferra Engineering website:

About FERRA

Ferra specialises in the design, manufacture, assembly and test of aerospace structures and sub-systems.

Serving local and overseas defence and aerospace companies, we support our customers on development programs, established platforms and provide a wide range of services including spare parts for regional, business and military services. Our products have proven to be highly competitive in international markets, with exports amounting to over 70% of our business.

One of our key success factors has been the formation of a number of alliances with major international aerospace and defence companies.

Based on ongoing performance and providing best value, Ferra has been able to continuously expand this market and has become one of the largest independently owned Australian manufacturers servicing the aerospace and defence industries.

Ferra is well recognised by industry and government as a leader in its field.

Listed below are some of the latest achievements:

2012 – Contract Award – Multiple long term agreements signed with Boeing for supply of P-8 components

2012 – Contract Award – Ferra Engineering awarded contract to produce Weapon Pylons and Mission Kits for the MH-60R Romeo Helicopter

2012 – Contract Award – Long term agreement signed with Boeing for supply of CH-47 components

2012 – Award – Ferra Engineering awarded Boeing Supplier of the Year for 2011 in the International Category from supply base of over 13,500 suppliers

2011 – Contract Award – Long term agreement signed with Boeing for supply of F-18 Rudder Pedal Kits

2011 – Contract Award – 5 year long term agreement signed with Boeing for 618 line items – Boeing CAS

2011 – Contract Award – 5 year long term agreement signed for 767 & 747-8 production components

2010 – Contract Award – 5 year long term agreement signed with Boeing for 51 line items for 747-400 commercial aircraft

2009 – MOU Signed – Ferra signed MOU with Lockheed for supply of F35 AME Weapon Adaptors for FRP to Marvin Engineering

2009 – Titanium R&D – Ferra presented first F35 titanium part produced by direct manufacture (titanium deposition) in Canberra to Lockheed Martin F35 Vice President Tom Burbage.

2008 – Award – Platinum supplier status award for Northrop Grumman

2008 – Award – Boeing award for outstanding supplier achievement for bulk head machining project

2008 – Partner with Lockheed on advanced R&D to research specialised titanium machining process

2008 – F35 business increased to estimated $1.1 billion over the life of the program

2007 – GE FAI approvals completed – All parts successful passed customer approvals

2007 – Research partnership with University of Queensland for development of titanium manufacturing processes assisted by Australian Government

2006 – Contract award for F35 AME Weapon adaptor assemblies

2005 – Award – Finalist Ernest & Young award for Entrepreneur of the year for Ferra Co-founder Mark Scherrer

2004 – Eurocopter (EADS) appointment as key Australian partner for Tiger / NH90 to supply pilot controls

Chemring Australia and Positioning as a Second Source Supplier for F-35 Flare Production

By Robbin Laird

While visiting Australia, and visiting various Australian defense facilities and participating in a future of airpower conference hosted by the Williams Foundation, I had a chance to talk with Thales as well as four suppliers for the F-35 program in Australia.

This provided a good sense of different approaches, which a variety of defense companies were taking to both Australia and the global market.

Chemring is a UK-owned defense company with factories in the UK, Europe, the US and Australia. The group as a whole makes specialized equipment for the defense sector including countermeasures such as chaff and flares, equipment to detect and destroy improvised explosive devices (IEDs), as well as grenades and ammunition.

My interview with Mark Hender, Managing Director of Chemring, Australia, provided a good sense of their preparation for the deployment of an F-35 fleet, and their ability to provide flares to that fleet. The company is part of the Chemring global group, with the plant in the United States being the first source for F-35 MJU-68/B and MJU-69/B flares and the plant in Australia in process to become the second source for F-35 MJU-68/B flares.

Chemring Australia's new state of the art facility in Lara, Victoria, is one of the world's most advanced countermeasures manufacturing plants. The facility incorporates remotely operated, automated production to ensure high standards of safety, product quality and flexible capacity.

Hender noted that their primary business has been to supply Australian forces, so that their output has been consumed within Australia, rather than being exported. They produce flares for the RAAF for various air platforms.

They have built a new modern, automated plant in Australia to both provide for their traditional business, and to be ready for the surge in production which will come with the needs of a deployed F-35 fleet.

The new plant is designed to enhance reliability and safety in the production of flares and is located near Melbourne, Australia.

The facility has the capability to manufacture all of the Australian Defence Force's requirements for countermeasure flares. The site has been designed to have the capability to manufacture countermeasures in support of all future air platforms.

The advantage of having a second source based in Australia for a key consumable, namely flares, is its ability to provide for the region's F-35s, USMC, USAF, USN, Japan, South Korea, Singapore and Australia. This provides an alternative transportation hub as well from which to deliver flares to the global warehousing system to be used by the F-35 fleet.

This will allow Chemring Australia to become an exporter FROM Australia to other countries in support the overall global F-35 fleet.

According to Hender, the flares for the F-35s will be different from legacy flares Chemring Australia currently manufactures but will draw upon their core competencies in design and manufacturing and make this a low risk effort to produce flares for the F-35 fleet. And it should be noted the Group is already producing flares for the initial fifth generation aircraft, the F-22.

In short, Chemring as a Group worldwide, and as a Company in Australia represents the kind of supplier in the F-35 program with a long history of work in the defense sector which is bringing their core competencies to provide low risk, high value solutions for the operations of the aircraft.

According to the company's description on their website:

Chemring Australia is a leading developer, manufacturer and supplier of high quality energetic materials and products for the Defence and Marine safety markets.

With more than 100 years' experience in our field we have built a reputation for supplying high quality products – on time and to our customer's precise specifications.

Our products include munitions, pyrotechnics, countermeasures, explosive ordnance disposal and counter IED solutions for military, law enforcement, industry and safety customers.

We maintain design, development, manufacture, testing and evaluation and support capabilities at our facility at Lara, Victoria.

Our long term relationship with the Commonwealth of Australia for the supply of countermeasures, pyrotechnics and munitions, is underpinned by our recent $30 million investment in establishing a state-of-the art countermeasure and pyrotechnic manufacturing facility.

This demonstrates how effective partnerships between government, defence and industry can promote innovation and holistic solutions, providing long term value for money whilst increasing Australian industry capability and global competitiveness.

Shaping a Global Opportunity: Marand Australia Participates in the F-35 Program

By Robbin Laird

The classic fighter import program for a country the size of Australia is to build for the domestic customer, the program ends, you do a little bit of sustainment work and then move on.

With the F-35 as a global program, a domestic supplier can position itself for global opportunities, and by so doing bringing core competitive competencies to the program itself. Investments up front are paid for downstream as the program continues to produce planes and generates demand for parts for a global fleet.

It is about getting the opportunity and then positioning to provide globally competitive value to the program itself.

For Marand, an Australian solutions provider, the F-35 program has provided a venue to shape new global relationships, which complement their Australian business.

According to the company's website:

Marand is a leading global supplier of precision-engineered solutions to a range of industries including Aerospace, Defence, Rail, Automotive and Mining.

Marand's customer base is predominately Blue chip organizations including Lockheed Martin, Boeing, BAE Systems, Ford, BHP, Rio Tinto and Holden for which it designs and manufactures complex innovative equipment

During my visit to Australia in March 2014, I had a chance to talk with David Ellul, Managing Director of Marand about the company and their involvement in the F-35 program.

The intersection between the evolution of the company's capabilities and their engagement in the program, a two-way street approach, was highlighted throughout the interview.

Ellul indicated that Marand started as a firm supporting the automobile industry in Australia and over time has transitioned into the aerospace and rail businesses. In fact, they have migrated over the past decade from having approximately 90% of their business in the automotive sector, to now less than 1% in automotive as the company has migrated to work in the other sectors in its portfolio.

Within aerospace, prior to F-35, their main client was Hawker deHaviland (now Boeing Aerostructures Australia) for whom they designed and manufactured Aerospace Tooling.

The initial engagement of Marand in the F-35 program was designing and building a unique trailer for installing the F-135engine into the F-35. The trailer also removes the engine.

According to Ellul:

The requirement is quite complex. It has to remove and replace the engine within a tight time frame in all of the environments where engines are changed. From the production line to ship board and land based sustainment. It has to do it for all three variants of the plane.

It has been a design and manufacturing job from the beginning. It is a clever piece of equipment that solves the customer's requirements. We are very proud of our design and engineering capability.

Prior to the F-35 program engagement, Marand has not been a global exporter. This has changed with the F-35 program.

The company has added five clients through the F-35 program, which has allowed it to grow its export business.

Question: Why Australia? Why Marand?

According to Ellul:

Australia has a tradition of innovation and although we are not a large company – we have 250 employees – we have diversified design and manufacturing experience and expertise and are able to solve complex problems and deliver good value, as we have done with the F-35 engine trailer.

The second part of our F-35 work is in design and manufacture of complex Aerospace tooling.

We have used our design and engineering capability to develop production tooling that makes our customers more productive.

Over 1200 tools to all corners of the F-35 world. And the quality of our work has been recognized by Lockheed Martin as well.

In 2009, the CEO of Lockheed Martin, Bob Stevens, visited our company and gave us an award recognizing our role as a leading tooling company in the program.

The performance on the engine trailer and tooling provided the opportunity to be considered by Lockheed and their partner BAE Syestms to provide Vertical Tails for the F-35 program.

According to Ellul:

We recently had a ceremony to celebrate the delivery of the first Australian vertical tail set for the F-35. Next year we will deliver 4-6 tail sets and by 2019 we will be delivering around 70 per year for the program. As the second source, we will do around 30% of the total production of vertical tail sets.

Once production ramps up, we'll be looking for other opportunities on Aerospace structural work. Five years ago, there's no way we would have proved that we had the capability. F-35 has done that for us.

But, with the ongoing help and support of Lockheed Martin and BAE Systems, we've created a whole new capability in Australia

And without them giving us the opportunity and trusting us and working with us and training us, okay, it wouldn't have happened.

Editor's Note: A ceremony was held on March 31, 2014 at the Marand plant to highlight the delivery of the first vertical tail produced for a F-35 by Marand.

According to a Lockheed Martin press release:

Melbourne, Australia, Mar. 31, 2014 – A ceremony was held today at Australian company, Marand, commemorating the delivery of the first ship of Australian made F-35 Lightning II Joint Strike Fighter vertical tails.

The Honourable Dr. Denis Napthine, Premier of Victoria and The Honourable Michael Ronaldson, Senator for Victoria representing the Defence Minister were among the distinguished guests in attendance.

This delivery of the first major air frame components marks an important production milestone for Marand, BAE Systems and Australia, demonstrating the significant industrial benefits the F-35 program brings to the growing Aus-

tralian aerospace industry. The work on the F-35 vertical tails is subcontracted to Marand by BAE Systems and is one of the largest planned manufacturing projects for the F-35 in Australia, with 722 ship sets anticipated.

The Honourable Dr. Denis Napthine, Premier of Victoria, sitting in the full scale mock up cockpit below, with David Ellul standing next to the cockpit during the March 31, 2014 Marand ceremony.

"We take our commitment to international participation very seriously, and today is a very proud day for us, for Marand, and for Australia's F-35 programme. In just two years, we have worked side by side with Marand to develop a world class aerostructure facility with a first-rate, repeatable capability for the next 20 to 30 years," said Cliff Robson, senior vice president F-35 for BAE Systems.

David Ellul, managing director of Marand, commented, "This is a major step for Marand to move into the field of aerostructures manufacturing. I am very proud of our team for achieving so much in such a short time with tremendous support from BAE Systems. The unique capability we have established will serve the Australian Defence industry and create high technology Australian jobs for many years to come."

The F-35 Lightning II aircraft will provide the Royal Australian Air Force with a transformational 5th generation fighter capability and provides significant benefits to the Australian aerospace industry, with more than $350 million (USD) already contracted and $6 billion (USD) in expected manufacturing orders over the life of the programme.

"The F-35 is not only transforming the battlefield but also the global aerospace industry. This programme is built on a foundation of unprecedented partnerships that not only tie our countries together, but also link our companies with one another. There's really no better example of the true global nature of this programme than right here at Marand," said Orlando Carvalho, executive vice president Aeronautics, Lockheed Martin Corporation.

Cross-Cutting Modernizations: MARFORPAC and PACAF Perspectives

The Marines, the Aussies and Cross Cutting Modernizations

By Robbin Laird

Soon the USMC Darwin Rotational Force will come to Australia to train with the Australians. What might not be as obvious as the images of the cross-training is the cross modernization of the two forces. It is not about the Marines simply coming ashore to train with the Aussies; it is about the Aussies accelerating their modernization within the region as well.

The Aussies are re-shaping their forces under the influence of a number of key new systems. The Aussies are undergoing a significant air combat modernization process. It began with the C-17, proceeded with the acquisition of 5 new Airbus tankers (being joined by 6 being bought by Singapore), 5 new Wedgetail airborne early warning & control (AEW&C) aircraft, and then the F-35.

During my time to the KC-30A squadron, RAAF officers took me through the simulators and let me try my hand at lowering the virtual boom to tank an F-16. Two of the five planes were at RAAF Base Amberley during the visit. Three of the five Aussie tanker aircraft are currently involved in maintenance, upgrade, testing, and residual acquisition activities in Madrid and Australia. The squadron fleet should be at full strength in 2015.

Last year, in combination with Australian C-17s, the KC-30A squadron supported several F/A-18 deployments to Guam as well as Darwin and Tindal in Australia's Northern Territory. This activity demonstrated the ability of the RAAF to move an air wing and support it at extended range with a tanker, while also providing airlift support. This year the squadron has supported movement of Aussie F/A-18s from the United States across the Pacific and back to Australia.

Both operations underscore capabilities, which are part of shaping a 21st century Air Force. From discussions at RAAF Base Amberley and in Canberra, it is clear that the squadron is a work in progress that represents a significant boost in capability for the RAAF. The tanker's potential is a clear advantage as seen by senior RAAF officers.

Standing up the squadron, finishing the procurement and getting initial use of the tanker underway is a prelude for what comes next – working through the best ways to use the tanker with the RAAF, and to work out its interoperable role in the region and beyond.

There have been problems with the boom on the tanker, but according to the head of the MRTT program in the Australian Department of Defence, the boom problem is well on the way to being resolved.

According to AVM Deeble, “We expect the boom to complete testing and undergo acceptance around third quarter of 2014. We are conducting the final Developmental and Qualification Test and Evaluation, which should be complete by mid 2014. We are focused on providing the RAAF with a firm basis for growing the boom capability by the end of 2014. Working collaboratively with Airbus Defence and Space through these final phases of the program will be key to delivering a world class tanker capability to the RAAF."

He indicated that the MRTT boom is a very advanced system, which provides significantly more capability than existing boom systems. He has been working on the program for some time and commented that challenges with the boom have been both software and hardware. “There are elements of the hardware which have posed problems aerodynamically; and the integration of the software and hardware to ensure the required operating envelope have taken some time to develop.”

Clearly, the recent decision by Singapore to select the MRTT to replace its own fleet of KC-135Rs validates the position taken by the Australian Department of Defence. Indeed, AVM Deeble indicated that supporting Singapore during their acquisition program will remain a priority for RAAF and will ensure an interoperable regional MRTT capability.

The Wedgetail is another advanced system in the RAAF 21st century force and is operated by No. 2 squadron, one of the most famous air squadrons in the RAAF, formed in 1916. According to the Squadron Commander, the system is “on the books” and ready to go to serve Australian needs and to contribute to coalition defense.

The Squadron Commander highlighted that the message going forward with the squadron was three fold: grow, integrate and prepare. Growth meant simply to fill out the squadron and enhance its operational capabilities. Integrate meant to build the squadron’s ability to work within the battlespace, to work effectively with the other Aussie forces and with coalition partners. Prepare for the system will always be evolving.

The always evolving part of it is not widely appreciated. This is a software upgradeable aircraft with a defined launch point (IOC) but no fixed end point (FOC). The system will always be evolving and growing as the software code gets rewritten to reflect events and demands from the squadron.

The squadron works through its experience and shapes change orders which get sent to the procurement authorities to sort out priorities for the next round of upgrading the aircraft.

The difference between older and such a new system was outlined by one participant in the roundtable held with the squadron at the airbase as follows:

“We have in the same time frame bought a CRC system full up which will look pretty much like it is in 20 years; with Wedgetail it will look nothing like it does now in 20 years.”

The Aussies have named their tanker squadron the Dragons, so here we see at No. 2 squadron the technology "Maoists" focusing on “continuous revolution” provided for a software upgradeable aircraft. With the coming of the F-35, which is also a software upgradeable aircraft, the Aussies are getting real operational experience with software upgradeability with the Wedgetail squadron.

The Aussie navy has added new cutting edge radar systems deployed on their frigates and is adding new amphibious ships as well as Aegis ships. And they are looking to integrate the Wedgetail and their F-35s with the fleet to meet the various challenges and threats in the region.

The final major piece to be added is the F-35. The F-35 is viewed by the Royal Australian Air Force (RAAF) as disruptive technology, and is embraced as such by the RAAF leadership. It is not just about doing things you can do now with a replacement aircraft; it is about doing things you can not do now with a transformational system.

The Aussie approach was discussed before, during and after a workshop held by The Williams Foundation on behalf of the Australian COS of the RAAF in mid-March at Canberra. The focus of the seminar was on Air Combat Operations: 2025 and Beyond. The Australian F-35 will enter into an environment of change and the central question addressed by the seminar was how to accelerate the kind of change necessary to deal with the threats and challenges in the neighborhood and beyond in the years ahead.

At the heart of the program were three speakers: SQNLDR Matthew Harper, No. 1 Squadron, Royal Australian Air Force, Lt. Col. Chip Berke and the VMX-22 Commander Mike Orr. The presence of the Marine aviators was a concrete manifestation of the cross-modernization opportunities. These three operators addressed the question of what the fifth generation experience was all about and how that experience would affect the evolution of the force in the decade ahead. Having operators address the issue of transformation and transition really focused the audience, which included significant attendance by the next generation RAAF officers.

The Aussie modernization cross-cuts with the 10 year effort the USMC is undergoing to shape what the Marines refer to as a distributed laydown in the Pacific. In broad terms, prior to the distributed laydown (ca. 2011), the Marines were located in Japan (25,000 in Mainland Japan and Okinawa), Hawaii (approximately 6,000) and on the West Coast (approximately 45,000 in California and Arizona). With the distributed laydown (ca. 2025), there will be a projected force distribution as follows: Mainland Japan and Okinawa (15,000), Guam (approximately 4700), Hawaii (approximately 8800), West Coast (approximately 43,000) and a rotational force in Northwest Australia of approximately 2500).

The working relationship of the USMC-USN team in the Pacific is operating in a dynamic decade in which various partners are evolving their own amphibious or expeditionary capabilities as well. The Australians and South Koreans are adding amphibious ships; the Japanese are extending the reach of their forces in the defense of Japan; and Singapore is adding F-35s and new tankers to extend its ability to defend the city-state.

The Marine Corps-USN team is obviously in the sweet spot to work these amphibious and expeditionary evolutions of core partners. And with regard to the new capabilities either in the region or coming the list is short but significant: the Osprey, the F-35B, the CH-53K, and the USS America. The Osprey is rapidly becoming a lynchpin for connecting the forces moving in the distributed laydown. It is also an intriguing platform for some players in the region who are thinking about its acquisition as well for it fits the geography and needs in the region so well.

The F-35B is coming first to Japan and will operate throughout the region. The Singhs are buying F-35Bs, the Aussies and Japanese for sure F-35As, with the Japanese interested in Bs as well. The point is simple: The Marines are coming first to the region with the airplane and are the launch point for shaping perceptions and crafting working relationships with key allies.

At the heart of shaping cross-cutting modernization is joint training. By using training ranges operating from Australia to the Mariana Islands to Guam, the Marines and the Aussies will shape common approaches built around the

new systems. In an interview conducted in Hawaii in mid-March 2014 with the MARFORPAC Commanding General, Lt. General Robling, the key role which the training and cooperation with Australia was highlighted.

"The President and the Australian Prime Minister in 2011 made an agreement to bolster this partnership. It was about two allies that can benefit further from a stronger more cohesive relationship.

I believe expanding what we do together in the northern training ranges is the next step in furthering this relationship. The training ranges offer us a venue for training together in very high end and sometimes complex scenarios. Due to their remote location, this training is away from encroaching civilian populations, thereby allowing us to train without negatively impacting or encroaching on their daily lives. We all win.

Training over distance is difficult in very many places around the world, and especially in the Asia Pacific region. In fact, the northern ranges in Australia are ideal for that type of combined training. Complementary to these ranges will be the Joint Training Ranges we are looking to develop on some of the Marianas Islands in and around Guam, Saipan and Tinian. In these ranges, we hope to have the ability to train across a broad spectrum of military operations from small unit maneuver to higher end air-to-air, combined arms, electronic warfare, and missile defense. This training will enable us to shape new joint and coalition approaches to defense while strengthening the collective security in the region."

In other words, the opportunity is not just for training but shaping relevant capabilities for 21st century operations. One of the organizers of the Williams Foundation seminar on 21st century air combat operations, Vice Air Marshal (Retired) John Blackburn summed up what he saw as the intersection of the USMC and Aussie modernizations.

"Having the Marines come onboard in Australia is important as well. It's really good to see how a truly a joint force is doing its job. One of the challenges we'll face in Australia is making sure that the Army, Air Force, and Navy work together in an even more integrated way to produce a better combat outcome.

And it's one of the key challenges for the Air Force is going to be to communicate that the JSF it's not just a shiny expensive airplane. This is a transformation point, a trigger. It can change the way not on the Air Force works but all the three services work together. The Marines are a great example of working the different elements of a joint force."

The Distributed Laydown in the Pacific and Deterrence in Depth: Lt. General Robling Discusses the Evolution of the USN-USMC Team in the Pacific

By Robbin Laird

After spending three weeks in Hawaii with the MARFORPAC staff, and the PACAF staff and the commander, and then two weeks in Australia for visits to airbases and to the Williams Foundation seminar on the evolution of air combat capabilities, I concluded my trip to the region by a meeting with Lt. General Robling, the Commander of MARFORPAC.

Shortly, the Marines will start their first rotational training in Australia. Naturally, Australia was on his mind in discussing the future.

Question: What our closest allies and we are actually doing is actually building deterrence in depth structure for Pacific Defense and part of that is clearly creating converging capabilities. Is that a fair judgment?

Lt. General Robling: It is to me. It's not about just building relationships in the region. It is about collective security in the region.

Building collective security requires, in part, a process of building partner capacity, and working convergent capacities to shape effective and mutually beneficial relationships which underlie the evolution of collective security.

Our working relationship with Australia is a case in point.

Even though they see themselves… rightly… as an island continent, they've really got to be part of the entire region's ability to respond to crisis, both natural and manmade. To do this, they can't stay continent bound, and must engage forward in the greater Asia Pacific region.

Cutaway of Canberra Class Ship. Credit: Royal Australian Navy. The Australians are adding amphibious ship capabilities to their joint force.

By becoming part of a collective Pacific security apparatus, they get the added benefit of defending their nation away from their borders. The Australian military is small in comparison to the US, but it is a lethal and technologically sophisticated force.

In the face of a large-scale threat, they, like the US and others in the region, wouldn't be able to defend by themselves. They would have to be a part of a larger collective security effort and ally with the US or other likeminded nations in the region in order to get more effective and less costly defense capabilities pushed farther forward.

This is one reason why their buying the JSF and the "Wedgetail" is so important. These two platforms are amazing force multipliers that bring to the region superior Command and Control and networked strike capabilities. These capabilities will be both additive and complementary to the capabilities other nations bring to collective security in the region.

The JSF with its superior networked sensor suite can collect a lot of information from sources at significant distances, and partner with the capabilities of the "Wedgetail" to help disseminate that information to air, sea, and land forces who need the information.

These capabilities and others make perfect sense for Australia and the greater Asia Pacific's collective security requirements. In addition, other countries like Japan and Singapore can likewise contribute to this collective security because they too are buying the same types or similar military capabilities.

I like the term deterrence in depth because that's exactly what it is. It's not always about defense in depth.

It's about deterring and influencing others behavior so they can contribute to the region's stability, both economically and militarily, in an environment where everyone conforms to the rule of law and international norms.

Question: I was asked by a senior Australian official to discuss potential sweet spots between the modernization of the Aussie and American forces. Clearly, one of those is between the evolving USN-USMC modernization efforts and those of the Australians.

And with the changes in the training ranges in Guam and around Guam plus those in Australia, there is a clear area within which the Aussies, Americans and other regional powers can shape that sweet spot in practical terms. Obviously, the Pacific fleet of F-35s can be built from an operational point of view within those training ranges as well.

This makes the Aussie-US relationship not just about training on Australian soil for the Marines but about a much broader dynamic relationship in the re-set of Pacific defense capabilities.

How do you see the relationship?

Lt. General Robling: Your point is very well taken. The President and the Australian Prime Minister in 2011 made an agreement to bolster this partnership. It was about two allies that can benefit further from a stronger more cohesive relationship.

I believe expanding what we do together in the northern training ranges is the next step in furthering this relationship. The training ranges offer us a venue for training together in very high end and sometimes complex scenarios. Due to their remote location, this training is away from encroaching civilian populations, thereby allowing us to train without negatively impacting or encroaching on their daily lives. We all win.

Training over distance is difficult in very many places around the world, and especially in the Asia Pacific region.

In fact, the northern ranges in Australia are ideal for that type of combined training. Complementary to these ranges will be the Joint Training Ranges we are looking to develop on some of the Marianas Islands in and around Guam, Saipan and Tinian. In these ranges, we hope to have the ability to train across a broad spectrum of military opera-

tions from small unit maneuver to higher end air-to-air, combined arms, electronic warfare, and missile defense. This training will enable us to shape new joint and coalition approaches to defense while strengthening the collective security in the region.

Question: When I talked with the PACAF staff and, specifically, General Carlisle, it is clear that a change is underway. The US is shifting from thickening bilateral spoke relationships to working new multilateral relationships among those powers with which we have bilateral treaty relationships.

Lt. General Robling: The growth of the Asian economy overall and especially those of our allies and friends has allowed many countries to enhance their security capabilities by buying more technologically advanced equipment.

It is not just about the US and what we bring to the region anymore.

Multi-lateral training and security agreements create a natural transition to working collective security in a way we never considered before.

Commander, U.S. Marine Corps Forces, Pacific, Lt. Gen. Terry Robling speaks with a U.S. Marine Corps honor guard following a commemoration ceremony here. The general commemorated ANZAC Day by laying down a wreath here on behalf of the United States Marines serving in the region. Other leaders and military component commanders also attended the ceremony. ANZAC Day is a national day of remembrance for the Australian and New Zealand service members who have fought in wars since World War I. Credit; US Pacific Command, 4/25/13

Question: As new hardware comes into the region, the exercises then allow you to work through joint and coalition concepts of operations and to be able to insert change effectively within a deterrence in depth strategy?

Lt. General Robling: You make a great point. The enhanced capabilities our partners are building through both training and hardware procurement will enable each of them to address individual security challenges while also providing us opportunities for partnerships that will naturally create a deterrence that covers large expanses of this large region.

The focus is not just on separate ground, naval and air forces.

The "AEGIS as my Wingman" concept is a great example of what platforms like JSF and AEGIS can do to individually become more capable by taking advantage of the synergy brought by each taking advantage of the other's capabilities.

This is exciting because it forces us to think of new ways to collect, disseminate, and then execute operations in ways we have never considered before.

And because the information will be accessible to our partners who are on the network, you can distribute the information to several partners simultaneously, making the collective defense and deterrence in depth concepts even more important to collective security.

I would argue that the commanders of the AEGIS ships haven't even thought about their role as wingman for fifth generation aircraft, but they will once the JSF is fully operationally and able to link its considerable capabilities with the significant capabilities of their ships.

Question: Your point is clearly that the process is not simply a one-way street with regard to allies in the region. It is about crosscutting modernizations, in which allies are bringing significant capabilities to the party. It is a challenge to re-set the working relationship to shape an approach like the Australian policy maker has in mind, namely to find sweet spots between allies modernization and those of the United States.

This is a challenge which requires a rethink from a bilateral arena where the US is providing capabilities for bilateral defense to one in which cross-cutting modernizations are being forged into deterrence in depth for Pacific defense.

How do you view the allied contribution?

Lt. General Robling: I think that sums up nicely the way ahead. Let me provide you with an Air Force example.

The U.S. Air Force has completely dominated the world with its ability to command and control large formations of technologically superior aircraft in any given battle space. In fact, their ability to provide a Combatant Commander with not just air supremacy but air dominance has been unmatched.

Now, they will be able to partner with some of our friends and allies that are buying strike aircraft like the JSF and command and control platforms like "Wedgetail". Air supremacy now doesn't have to come from US assets alone.

Question: My next to final question is about HA/DR or humanitarian assistance and disaster relief challenges. These are part of the challenges in the region but also part of the ongoing efforts to reshape the USN-USMC team to be more effective as a force in the region. How do you view the role of HA/DR within the operational context?

Lt. General Robling: Recently, I had a discussion with a think tank in Australia. After I spoke, one individual asked me if was talking out of both sides of my mouth by emphasizing the Marine Corps capabilities to fight and win on

the battlefield, while at the same time emphasizing how important we are to responding to HA/DR disasters in the region.

I simply pointed out that we have only one US Marine Corps; one USN-USMC team. They're all steely-eyed trained killers, but because of the way we train, equip and organize, we are just very, very good at responding to disasters, and doing so in a way better than anyone else can. I also emphasized that not one of those Marines carries a military occupational specialty code that relates to HA/DR.

Question: My final question is about the impact of the distributed laydown and exercises on equipment needs.

It is clear that as the USAF focuses upon distributed its assets within the region to maximize its effectiveness, that C-17s become a priority asset, not easily available to the US Army or USMC. This must mean for the USMC that the demand on amphibious shipping and MSC, on the one hand, and the KC-130J tanking and lift fleet goes up.

How do you view the impact of the demand signal in this area?

Lt. General Robling: The demand signal goes up every year while the cost of using the lift goes up every year as well. This has me very concerned.

Commander, U.S. Marine Corps Forces, Pacific, Lt. Gen. Terry Robling speaks with a U.S. Marine Corps honor guard following a commemoration ceremony here. The general commemorated ANZAC Day by laying down a wreath here on behalf of the United States Marines serving in the region. Other leaders and military component commanders also attended the ceremony. ANZAC Day is a national day of remembrance for the Australian and New Zealand service members who have fought in wars since World War I. Credit; US Pacific Command, 4/25/13 Read more: http://www.dvidshub.net/image/916168/uspacom-c

Commander, U.S. Marine Corps Forces, Pacific, Lt. Gen. Terry Robling speaks with a U.S. Marine Corps honor guard following a commemoration ceremony here. The general commemorated ANZAC Day by laying down a wreath here on behalf of the United States Marines serving in the region. Other leaders and military component commanders also attended the ceremony. ANZAC Day is a national day of remembrance for the Australian and New Zealand service members who have fought in wars since World War I. Credit; US Pacific Command, 4/25/13

The truth of the matter is the Asia Pacific region is 52% of the globes surface and there are over 25,000 islands in the region. The distances and times necessary to respond to a crisis are significant. The size of the AOR is illustrated in part by the challenge of finding the missing Malaysian airliner.

If you don't have the inherent capability like the KC-130J aircraft to get your equipment and people into places rapidly, you can quickly become irrelevant. General Hawk Carlisle uses a term in his engagement strategy which is "places; not bases".

America doesn't want forward bases. This means you have to have the lift to get to places quickly, be able to operate in an expeditionary environment when you get there, and then leave when you are done.

Strengthening our current partnerships and making new ones will go a long way in helping us be successful at this strategy. We have to be invited in before we can help. If you don't have pre-positioned equipment already in these countries, then you have to move it in somehow.

And, right now, we're moving in either via naval shipping, black bottom shipping, or when we really need it there quickly, via KC-130J aircraft or available C-17 aircraft. Right now, we are the only force in the Pacific that can get to a crisis quickly, and the only force that operates as an integrated air, sea and ground organization.

This takes us full circle back to the Australians. They are working to more effectively to integrate their air, ground and naval forces and, as a result, our ability to find and cultivate " a mutual sweet spot" with them will go up over the next decade.

The PACAF Commander and Reworking Pacific Defense

By Robbin Laird

After a week of discussions with the staff of the US Pacific Air Forces or PACAF, I was able to sit down with Hawk Carlisle, the Commander PACAF towards the end of the week to pull a broader picture together from those conversations and to discuss the way ahead as seen from the command with regard to Pacific Defense.

The conversation on February 27, 2014 was just after the North Koreans had fired missiles into South Korean waters during an allied exercise for the defense of South Korea.

Deterrence in Depth

It is clear that several strands of activity – joint and coalition – are being woven together by the USAF with its joint and coalition partners.

In effect, the US is shaping a deterrence in depth strategy to ensure that the US national command authority has options to deal with threats in the Pacific and allies can have confidence in the viability of a vibrant US combat force in the Pacific.

Integration of Air and Missile Defense

The first strand is clearly a growing capability to integrate air and missile defense systems throughout the Pacific, including US Army, US Navy, US Air Force and allied systems. The effort is designed to shape an integrated collaborative force able to operate to deal with a wide range of missile threats.

According to General Carlisle:

The PACCOM Commander has put me in charge of how we are going to do integrated air and missile defense for the Pacific theater, which represents 52% of the world's surface. This is clearly a major challenge and is clearly both a joint and coalition operation.

In an earlier interview, Brigadier General Daniel Karbler, 94th Army Air and Missile Defense Command, highlighted that the task of the Army role within an integrated enterprise as follows:

The role of having active defense or an interceptor force is to buy time for [Lieutenant] General [Jan-Marc] Jouas (7th USAF Commander in the Pacific) or General [Hawk] Carlisle (the PACAF Commander) to more effectively determine how to use their airpower. It also allows the National Command Authority to determine the most effective way ahead with an adversary willing to strike US or allied forces and territory with missiles.

(From left) U.S. Air Force Major Gen. Paul McGillicuddy, Pacific Air Forces chief of staff, Japan Air Self-Defense Force Maj. Gen. Yutaka Masuko, Director of Defense Operations, Plans and Communications Directorate at the Air Defense Command Headquarters, Maj. Gen. Kevin Pottinger, Individual Mobility Augmentee to the Pacific Air Forces vice commander, and Japan Maritime Self-Defense Force Rear Adm. Ryo Sakai, Commander of Escort Flotilla 1 at Self-Defense Fleet, and U.S. Army Brig. Gen. Daniel Karbler, 94th Army Air Missile Defense commanding general, plan together during Integrated Air and Missile Defense Wargame V on Feb. 14, 2014, in the 613th Air Operations Center at Joint Base Pearl Harbor Hickam, Hawaii. (U.S. Air Force photo by Staff Sgt. Nathan Allen)

General Carlisle focused on the way ahead to achieve the overall integrated air and missile defense mission designed to achieve the objectives outlined by BG Karbler.

We are pursuing an approach that combines better integration of the sensors with the shooters with command and control.

Command and control are two words.

The way ahead is clearly a distributed force integrated through command and control whereby one develops distributed mission tactical orders (with well understood playbooks) reflecting the commander's directions and then to have the ability to control the assets to ensure that the sensors and shooters accomplish their mission.

Shaping an integrated enterprise is not a futuristic mission for the integration of Patriots, Aegis and THAAD is already a work in progress, but General Carlisle sees the approach getting better over time as new systems come to the Pacific, including a fleet of allied and US F-35s.

We need to get better at attack operations to take out the shooter.

How do we do that better?

It is clear that an F-35 fleet coupled with the new long range strike systems will play a key role in that function.

We also need to shape game changers in terms of the missiles used to intercept missiles.

The current generation is expensive and we need to drive down the cost point for interceptors.

SM-6 is coming which is an important asset but DOD is working hard on ways to drive down the cost of future interceptors.

And we are working the passive defense piece of the puzzle as well including hardening, concealment, dispersal of assets, rapid runway repair and support for a fluid force operating in a distributed manner.

General Carlisle underscored as well that the Command was working with allies to integrate those with assets and willingness to do so into the evolving capability. Indeed, there was a recent US-Japanese joint exercise, which worked directly on the integrated piece for air and missile defense, and with significant Japanese investments in such systems this is an obvious step forward.

And the South Koreans are obvious players as well with their Patriot and Aegis systems and with the Australians buying Aegis and F-35 they will be players as well in the future

The Impact of a US and Allied Pacific Fleet of F-35s

The roll out of the sensor-shooter C2 approach for an integrated air and missile defense system also lays down a capability that a decade from now when the fleet of allied and American F-35s is operational will be able to leverage as well.

By having shaped an approach towards integrated sensor-shooter relationships within which C2 was being worked, the F-35 as a sensor and shooter laid on top of that grid would be an immediate force multiplier.

General Carlisle was asked what would be the impact of a fleet of F-35s (allied and US) upon a Commander of PACAF a decade out.

It will be significant.

Instead of thinking of an AOC, I can begin to think of an American and allied CAOC (Combined Air Operations Center).

By sharing a common operating picture, we can become more effective tactically and strategically throughout the area of operations.

Dispersal and Distributed Operations

Two F-22 Raptors fly over Wake Island as part of a rapid deployment June 21, 2013. Credit: USAF

A key initiative fostered by General Carlisle is to work ways to disperse aircraft and to land aircraft on airfields from which they did not take off.

The Rapid Raptor concept where 4 F-22s are supported by a C-17 at an airfield different from where they took off is a clear indicator of the projected trend line.

From discussions earlier with the PACAF staff, it is clear that a major effort is underway to shape the logistics and support approach to allow for the operation of a dispersed air force executing a distributed operational approach throughout the region.

The Impact of Allied Modernization

Allied modernization efforts are a key part of the building of a 21st century Pacific defense approach.

General Carlisle has coined the term "places not bases" as his command's way of discussing working with partners and allies throughout the region providing logistical support and coordinated capabilities which allow the US and those partners to work together in a variety of contingencies.

Gen. Hawk Carlisle (left), Pacific Air Forces commander, and Maj. Gen. Hoo Cher Mou, Republic of Singapore chief of air forces, shake hands after unveiling two newly-painted F-16 tail flashes following the Peace Carvin II Parade Dec. 11, 2013. The painted tail flashes commemorate the 20th anniversary of the RSAF partnering with Luke Air Force Base in training fighter pilots. (U.S. Air Force photo by Staff Sgt. Luther Mitchell Jr.)

The exercise regime is clearly part of this effort, as exercises provide the opportunity to test out and enhance logistical and support approaches as well as to shape convergent con-ops where appropriate.

With regard to modernization, General Carlisle noted "this AOR is the most rapidly growing military aviation market worldwide. Investments are being made and the willingness of our allies to work with us in rolling out a common fleet of F-35s is a key common investment which will significantly enhance our collective ability to provide for effective Pacific defense."

Among the investments being made by the allies which we discussed beyond missile defense and F-35 were tankers and the Aussie Wedgetail.

Several allies are either adding new tankers or plusing up their inventory of tankers and, according to Carlisle, "the allied tanker contribution is being enhanced and a more robust tanker fleet is a hugely positive development."

From left) General Hawk Carlisle, Pacific Air Forces commander; Mr. Scott Dewar, Australian Consul-General in Honolulu, Hawaii; and Maj. Gen. Kevin Pottinger, PACAF Chief of Operations, climb aboard a Royal Australian Air Force E-7A Wedgetail Airborne Early Warning & Control aircraft on the flightline at Joint Base Pearl Harbor-Hickam, Hawaii, August 26, 2013. The RAAF Wedgetail and crew were at JBPH-H on a stopover on the return home from participating in Red Flag-Alaska. AEW&C aircraft can control the tactical battle space, providing direction for fighter aircraft, surface combatants and land based elements, as well as supporting aircraft such as tankers and intelligence platforms. RAAF Wedgetail crew provided static displays and a familiarization flight to JBPH-H personnel, to familiarize Airmen with RAAF Wedgetail capabilities. (U.S. Air Force photo/Staff Sgt. Nathan Allen)

He cautioned that to get the full benefit of more allied tankers would require working together to shape effective concepts of operations for a US and allied fleet working together.

We then discussed the new air battle management system bought and developed by the Aussies, the Wedgetail.

I have been on the aircraft and it has just recently participated in Red Flag 2014 It is a very capable aircraft, but when it first showed up at an allied exercise in 2010 it has serious challenges with regard to interoperability. There have been huge strides with regard to its capable to be interoperable.

There are two dynamics at work with regard to the shift.

The first was "the working relationship between the Australian Air Force (RAAF) and the USAF in focusing upon better integration of our various air battle management systems."

The second is simply that the Wedgetail is a new generation of software upgradeable aircraft. The ability to evolve the capability of a software upgradeable aircraft (the F-35 is one as well) was highlighted in one of the RAAF interviews conducted by the Australian defense journalist Ian McPhedran in his book Air Force:

"Someone asked me, "When will we get the full technical maturity out of Wedgetail?

" I answered "never" because it will just continue to grow and the capability will be far greater in 30 years than what it is now.'

McPhedran, Ian (2011-08-08). Air Force (Kindle Locations 5776-5777). HarperCollins Publishers. Kindle Edition.

And translating Aussie working relationships with allies into software code is part of the process of enhancing capability over time.

The Unique USAF Role

General Carlisle closed by highlighting what he saw as a unique USAF opportunity within the evolving Pacific Defense.

The USAF is the only service in the US with decades of experience with stealth aircraft, with regard to how they work, how they change the operational reality for pilots and how they are sustained. Within the region, we can help allies to avoid paths which will not be optimal for their emerging fifth generation fleet of aircraft.

He highlighted as well that the learning path on which the F-22 has taken the USAF is important in ways other than simply air-to-air combat.

We have tested an F-22 with its sensors teeing up a T-LAM strike from a submarine against a moving target. This is the future, whereby the weapons on target are not simply carried by the aircraft but the forward based sensor can provide the moving target and over time those forward sensors can well have the ability to direct that weapon to the target.

The Rise of Pacific Warriors: Training for 21st Century Joint and Coalition Operations

by Ed Timperlake and Robbin Laird

The image of the Marines fighting in Guadalcanal or the US carriers fighting their way through the Japanese fleet in the Pacific are core images for war in the Pacific burnt deeply in the memory of Americans.

The challenges are different this time around but a new generation of Pacific warriors is being trained and shaped for missions central for Pacific defense and for the protection of US interests and the security of Americans living in the homeland.

There are clear links between tradition and the future such as when one visits the headquarters of the USMC in the Pacific.

The HQ building is named for HM Smith or "Howling Mad" Smith of Guadalcanal fame. Now those Marines working in the HQ building look out onto a Pacific with threats from both the PRC and North Korea facing them, and various challenges across the spectrum of warfare throughout a region very large, and very complex.

U.S. Marine Sgt. Robert W. Walker, center, explains the capabilities of the miniature deployable assistance water purification system to U.S. Marine Lt. Gen. Terry G. Robling at a disaster site in Biang, Brunei Darussalam, June 19 as part of the Association of Southeast Asian Nations Humanitarian Assistance/Disaster Relief and Military Medicine Exercise (AHMX). The disaster site is the location of the field training exercise portion of the multilateral exercise, which provides a platform for regional partner nations to address shared security challenges, strengthen defense cooperation, enhance interoperability and promote stability in the region. Robling is the commanding general of U.S. Marine Corps Forces, Pacific. Walker is an engineer equipment electrical systems technician with 9th Engineer Support Battalion, 3rd Marine Logistics Group, III Marine Expeditionary Force. 6/19/13

The recent search for the missing Malaysian airliner reminds us of the vastness of the Pacific and the challenges of operating in such a vast region. Covering a territory which covers so much of the earth's surface and with thousands of islands present a tapestry of operational complexity.

This is no place for amateurs.

As Admiral Nimitz confronted the last century's challenges he concluded a core lesson for this century's Pacific warriors:

"Having confronted the Imperial Japanese Navy's skill, energy, persistence, and courage, Nimitz identified the key to victory: 'training, TRAINING and M-O-R-E T-R-A-I-N-I-N-G.' as quoted in Neptunes's Inferno, The U.S. Navy at Guadalcanal (James D. Hornfischer)"

The US and its core allies are shaping new capabilities to deal with the various threats and challenges in the Pacific in the time of the Asian century. Flexibility in operations and agility in inserting force with a proper calibration of effect will be enhanced as new systems come on line in the years ahead: the Royal Australian Air Force (RAAF) combination JSTRS and AWACS platform (remember the E-10 we did not buy) Wedgetail, the KC-30A (remember the advanced tanker developed for the USAF being operated by the RAAF and soon by the Singapore Air Force, 11 to be

clear), the F-35 (where there are as many allied aircraft as US aircraft coming to the region), the USS Ford, the USS America, new missiles, the Osprey in the hands of the US and its allies, etc.

Aircraft from the U.S. Air Force, U.S. Navy, Japan Air Self-Defense Force, and Royal Australian Air Force fly in formation over the Pacific Ocean in support of exercise Cope North 2013, Andersen Air Force Base, Guam, Feb. 5, 2013. During this event, the aviators trained on war-fighting integration tactics. Cope North is a multilateral aerial and humanitarian assistance and disaster relief exercise, held annually, designed to increase the combat readiness and interoperability of the U.S. military, JASDF, and RAAF. (Courtesy photo/Jim Haseltine/Released)

But these systems will have the proper effect only in the hands of skilled warriors.

And in this century this will mean not only the US training effectively but doing so from the ground up with its core allies and partners.

Recently, in an interview with members of the PACAF staff the growing salience of multinational exercises and training for the core competencies of the USAF and the joint force was underscored with regard to Red Flag 2014:

As one participant put it:

Our role as a facilitator is growing in broadening the engagement opportunities for allies to work together.

A good image of the change is that an Aussie Wedgetail was doing Command and Control for US, Japanese and South Korean jets at the recent Red Flag exercise.

And, for the first time, South Korean jets crossed through Japanese air space to come to fly with the participants in Red Flag.

Indeed, the ability of allies to work together in such a manner is a key part of the deterrence in depth strategy necessary to ensure the peace in a challenging Pacific region.

As Lt. General Robling, the Commanding General for the USMC in the Pacific put it in a recent interview:

It's not about just building relationships in the region. It is about collective security in the region.

To build out collective security requires in part for us to engage in process of building out partner capacity, and working convergent capacities to shape effective and mutually beneficial relationships underlying the evolution of collective security.

Our working relationship with Australia is a case in point. Even though they, they see themselves as an island continent, they've really got to defend themselves much more forward than just waiting for threats to arrive.. And with the size of their force, they wouldn't be able to do that by themselves. They would have to be a part of a, a collective security effort and ally with the US and other allies in the region in order to get more effective forward operating defense capability.

That's why it's important for us that they are buying JSF. That's why it's important that they have a Wedgetail. By having the two, they will combine an amazing airborne command and control capability with features of the JSF that can, that can increase their regional reach.

With the JSF, that can, that can take its sensors and pull in a lot of things that are happening from, a significant distance into a Wedgetail that's flying off the coast of Australia. It makes perfect sense for them.

And when you have other countries like Japan buying the same types of military hardware, Singapore buying the same types of military hardware, the U.S. that's forward deployed with similar hardware, it makes for a collective security capability that has a lot of depth.

I like the term deterrence and depth because that's exactly what it is. It's not about defense and depth. It's about deterring and, and influencing others behavior so they, they comply with international norms.

The equipment is crucial; the technology is essential; sustainability over the vast distances of the Pacific a sine qua non of operational success.

But convergent modernization works only if there is in Admiral Nimitz's words: "Training, training and more training."

A Japanese landing craft air cushion (LCAC) lands on Red Beach as part of the initial offload for Exercise Dawn Blitz here, Camp Pendleton, CA, May 31, 2013. Credit: 11th MEU.

This point was emphasized throughout during a recent visit to MARFORPAC, PACAF and in Australia. It is clearly understood by the US forces in the region and our allies that collaborative efforts and effective joint forces do not happen by chance; you train to gain your tactical and strategic advantages.

There are two significant components of a nation's military force that must be understood and focused on at the highest levels of a nation's national military command. It is very simple to say and hard to execute; technology has to be available but it also had to be successfully understood and employed.

Just the word "available" carries with it significant operational challenges.

Simple numerical comparisons, and Orders of Battle, are useful and helpful to understand a strategic balance but can ignore important quantitative and qualitative factors.

For example, just counting force comparisons of total inventories can leave out essential considerations of regional deployments and U.S. alliance responsibilities. In addition, static comparisons may ignore the technological imperative affecting both the quality and quality of continuous weapon systems modernization initiatives.

On the human factor side, the measure of "successfully understood and employed" is the greatest challenge until actual combat. A nation has various cultural factors that impact on the selection process of their warriors. The best military is always built on the principle of meritocracy, promotion "up or out" is not just a slogan but one of the most important factors in building the critical intangible question;

Can a force at all ranks fight and win?

Out of a nation's youth, there needs to be a selection process, then a basic training process progressing to combat training and comprehension of tactics and then continuous proficiency training. This really has not changed since armies came into existence and it always takes moral courage and good judgment by leaders who are not afraid of leaving many behind.

Embrace allies and always assume a reactive enemy can help in the effort to develop the necessary technology to try and mitigate any advantages. But with the worldwide proliferation of weapons even a second or third world nation might have state-of-the art systems. This enhances the importance of competence and preparation.

(From left) U.S. Air Force Brig. Gen. Paul McGillicuddy, Pacific Air Forces chief of staff, Japan Air Self-Defense Force Maj. Gen. Yutaka Masuko, Director of Defense Operations, Plans and Communications Directorate at the Air Defense Command Headquarters, Maj. Gen. Kevin Pottinger, Individual Mobility Augmentee to the Pacific Air Forces vice commander, and Japan Maritime Self-Defense Force Rear Adm. Ryo Sakai, Commander of Escort Flotilla 1 at Self-Defense Fleet, and U.S. Army Brig. Gen. Daniel Karbler, 94th Army Air Missile Defense commanding general, plan together during Integrated Air and Missile Defense Wargame V on Feb. 14, 2014, in the 613th Air Operations Center at Joint Base Pearl Harbor Hickam, Hawaii. The exercise provided opportunities to simulate integrated engagements between joint U.S. forces and Japan Self-Defense Forces, while aiming to promote missile defense interoperability. (U.S. Air Force photo by Staff Sgt. Nathan Allen)

A country's military may have figured out all of the above but is going down a warfighting path that is often referred as asymmetric. "Asymmetric" is often thrown as an insightful debating point when it is just a simple way of saying at all times be cautious of the famous intelligence community dictum, avoid "mirror imaging" Of course asymmetric works both ways for opponents. One side maybe "asymmetric" and totally misdirected in terms of what is required for mission success. The problem is that mistakes will only be found out for real when the first round goes down range.

The other debating point often used is "disruptive technology" often a proposed deus ex machina that can be raised to take counsel of ones fears. The atomic bomb was a major "disruptive technology." Being very specific the world wide scientific community has many, many papers in prestigious journals that capture trends of research that can lead to the next generation of "disruptive technology." But briefing slides only kill audiences; they are not effective in battle.

Caution about the next disruptive technology is well taken, but it is often well-known globally, and it is more a race to actually putting the system into play and figuring out how to use it. This is why the cautious weapons testers holding back warriors get their hands on new platforms and figuring out what the path to upgrading them can be a clear problem.

Technologies are not disruptive in and of themselves.

Their effectiveness to become disruptively decisive will depend on the skill of the force.

A member of the Japan Air Self Defense Force observes Royal Australian Air Force KC-30A crews refuel RAAF F/A-18's while participating in Cope North 13 near Anderson Air Force Base, Guam, Feb. 13, 2013. Cope North is an annual air combat tactics, humanitarian assistance and disaster relief exercise designed to increase the readiness and interoperability of the U.S. Air Force, Japan Air Self-Defense Force and Royal Australian Air Force. (U.S. Air Force photo by Senior Airman Matthew Bruch/Released). 2/12/13

If we were waiting for the weapons testers, the Osprey revolution underway in the USMC would be an idea, not a reality.

Across the Pacific the US has coined a term the Air/Sea Battle, but it is not just a set of briefing slides. It is about real warriors figuring out how to get the kind of innovation and integration in the joint forces which can position the US and its allies to shape an effective Pacific defense strategy.

As Navy Captain Pat Connelly, currently the liaison from PACFLT to PACAF, underscored in a recent interview:

Basically, the Air Force and the Navy have been working at supporting one another for a long time. Air-Sea Battle is really just the next phase in codifying and further developing what we are already doing.

We are looking to enhance cross-domain synergy and to do a better job in coordinating and integrating the sensors and shooters which the US Army, USAF, USN and USMC can bring to bear on defense problems, and to work more effectively with allies contributing capabilities as well to the broader Pacific defense challenges.

It is Admiral Nimitz who must be listened to and not the "cubicle commandoes" in the DC "word tanks" to define the reality of air-sea battle. We report regularly on the words and actions of the military and civilians in the Pacific of all ranks in many nations that can give Americans the true picture of the state of the art of the 21st century Pacific warriors because that is who they are.

As Putin and his soldiers redraw the map of Europe, it is useful to remember that the Cold War was won in part by the US military and civilian leadership working with our closest allies in Europe in the effort to reshape US and allied forces to put in place a military approach which took the effectiveness of the Soviet military right off of the table.

It was clear to the last great military leader of the Soviet Union, Marshal Ogarkov, that the new air-land battle doctrine, equipment and training made the legacy Soviet forces a diminishing asset and argued for his own scientific-technological revolution to get ahead of the curve.

Fortunately, with the Farewell Affair built around a partnership between President's Reagan and Mitterrand, the Soviets lost inside access to the evolution of US and allied military technologies. Their ability to compete severely reduced, the military underpinnings of credible Soviet military dominance in Europe was ending.

This is a lesson, which the PRC might well need to learn as well.

A remarkable US Army leader towards the end of his life indicated the crucial role which the reshaping of the US and allied militaries under the influence of Air-Land battle played in reshaping the strategic balance in Europe.

General Starry later told Army historians that in his view the three most important differences between the 1976 and 1982 versions of FM 100-5 were that the later version included a set of operational concepts that put us back on the nuclear and chemical battlefield, thus ensuring that an enemy's surprise or first use of such weaponry would not enable him to win the war thereby; that it recognized and addressed the importance of attacking the enemy's second and following echelons; and that it dealt with the balance between firepower and maneuver.

Re-shaping the doctrine, re-equipping the force, working a close cross-modernization process with allies, and "training, training and more training" reshaped the NATO forces facing the Warsaw Pact and contributed to the erosion of the Soviet Union.

The Pacific today is as demanding as the 1980s for challenges and dynamics of change.

As Putin has made clear by his latest actions, history is on the move once more. The challenge is to prepare, be ready and to provide for the kind of deterrence, which informs adversaries in advance that staring down the United States and its allies is not worth the effort.