Leverage Allied Investments and Combat Learning Experience in Modernizing the U.S. Military

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F-35, P-8 and New Allied Capabilities

In this Special Report, we look at a number of areas in which core allies have created new capabilities, which compliment and can supplement US capabilities. The F-35 and P-8 are laying the foundation of global combat learning and at the same time allies are operating, developing and deploying new capabilities, which clearly compliment these new combat capabilities as well.

Recently, the Minister of Defence for the UK made the argument for the US opening the aperture with regard to non-US systems. But it is not simply a question of trade policy – it is about getting serious about rapidly equipping a US combat force which needs to prepare for the certainty of high intensity combat.

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F-35, P-8 AND NEW ALLIED CAPABILITIES

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INTRODUCTION

In this Special Report, we look at a number of areas in which core allies have created new capabilities, which compliment and can supplement US capabilities.

The shift from slo mo to preparing for high tempo and high intensity operations is a major challenge for the US military and its allies. It is about a culture shift, a procurement shift, an investment shift. But mobilization is even more important than modernization.

To get ready for the shift, inventory needs to become more robust, notably with regard to weapons. In visiting US bases, a common theme in addition to readiness and training shortfalls, is the challenge of basic inventory shortfalls and the need to find ways to accelerate modernization of the forces.

One way to do so would be leverage extant allied programs and capabilities which if adopted by the US forces would save money but even more importantly ramp up the operational capability of the US forces and their ability to work with allies in the shortest time possible. By so doing, the US could target investments where possible in break through programs which allies are NOT investing in.

At the same time, with the introduction of the F-35 and P-8 as new combat assets for US forces, core allies are operating these assets in the same time period as the US and are or will contribute significant operational innovations to these core platforms, and as such are plank holders in global innovation for even the most advanced US combat assets.

Opening the aperture for cross adaptation is crucial with the new combat systems, and with the software upgradeable platforms. These changes will also pressure not simply the outdate US acquisition system but the dysfunctional and ponderous US security system. With "secret squirrels" placed everywhere in the combat system, the ability to leverage data and to do on the fly decision making will not be possible and with that the sub-optimization of the US combat forces or worse.

The F-35 program is a stake in the heart of the classic modernization system of DOD but if the old practices prevail, the significant potential of the program will be lost as well.

In this Special Report, we focus on the twin dynamic of allied innovations and the opportunity to leverage these innovations to enhance both coalition and American combat capabilities.

For are most recent *Second Line of Defense Forum*, which is focusing on the shift from slow mo to high intensity operations and the impact of such a shift, see the following:

http://www.sldforum.com

OVERVIEW

The Trump Administration has come to power promising to correct readiness shortfalls and slow roll out of inventory and modernization. But there simply is not enough time and money to do readiness and training plus ups, mobilization and rapid modernization.

Donald Trump as a businessman might take a look at how DoD could actually functions as an effective business in equipping the force and having highlighted the question of allies might be pleased to learn of significant allied investments in new combat systems which his own forces can use, thus saving money and enhancing capability at the same time.

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One way to augment the force would be to do something, which would seem to be at odds with the Make America Great notion. As one Danish analyst put it well: "I have no problem with the idea of making America great again. For me, the question is how?"

One way to do so would be leverage extant allied programs and capabilities which if adopted by the US forces would save money but even more importantly ramp up the operational capability of the US forces and their ability to work with allies in the shortest time possible. By so doing, the US could target investments where possible in break through programs which allies are NOT investing in.

It is time to take a global view as the coming of the F-35 and the P-8 have made it very clear that global technology is a key element for shaping 21st century high intensity combat forces, even when leaders seem to be at odds.

There are many examples of this low hanging fruit, which can be exploited. And the old bromide that this would cost US jobs is simply not true – foreign producers like American ones build in the country where they export rather than simply exporting the end product.

First, there is question of rapidly inserting unmanned assets. While the US Navy researchers how to provide for new capabilities, allies are already deploying a key underwater unmanned asset to work the demining issue. It would make sense simply to operate and learn from this capability rather than simply experimenting with prototypes.

The SAMDIS solution is in use by several allies.

As Norman Polmar and Robbin Laird have argued:

Undersea warfare is becoming more complex as an increasing number of nations are operating submarines, advanced submarines and seafloor mines are being proliferated, and there are an increasing number of seafloor military and commercial activities world wide.

Thus, there are increasing demands for navies to have enhanced capabilities to carry out surveillance to support anti-submarine warfare, mine countermeasures, general surveillance, and "special missions" in the depths.

Further, because of the need for rapid-reaction to crises and the varied ocean operating environments, these surveillance capabilities must be deployable by surface ships and small craft, submarines, and aircraft, especially helicopters.

This situation must be met by advanced, flexible, and highly capable sensor platforms.

Lethal Threats

Mines are major threats to warships as well as commercial shipping. According to mine warfare analyst Dr. Scott Truver. "Enemy mines caused massive numbers of U.S. ship losses in the last century, during both wars and crises," he explained.

"During the late 1980s and early 1990s a U.S. guided missile cruiser, a large helicopter assault ship, and a frigate were heavily damaged by mines in the Persian Gulf," Truver recalled. "And many more vessels were mine victims during the 'tanker war' in the Persian Gulf in that period."

While potential enemies also have anti-ship missiles and torpedoes to threaten ships, "mines can be quickly and surreptitiously laid by surface ships—including simple junks, fishing boats, and other coastal craft—submarines and aircraft."

"Indeed," Truver underscored, "the U.S. Navy's experience underscores the lethality of the threat. Of the 19 U.S. Navy ships that have been seriously damaged or sunk by enemy action since the end of World War II, 15 of them—nearly 80 percent—were mine victims."

Potential American adversaries are estimated to have on the order of 386,000 naval mines—China has approximately 80,000, Iran 6,000, North Korea 50,000, and Russia 250,000, according to published intelligence sources.

The global threat in 2017 includes more than a million sea mines of more than 300 types in the inventories of more than 50 navies worldwide.

This array of threats coupled with other beneath-the-surface missions demand advanced underwater surveillance and detection systems.

Potential non-military missions include monitoring and surveying seafloor areas for underwater structures, pipelines, etc.

The SAMDIS Solution

Advanced Acoustic Concepts, a DRS/Thales joint venture based in the United States, has devised SAMDIS—Synthetic Aperture and Mine Detection Imagery Sonar—a system with multiple capabilities that can be rapidly deployed to provide the underwater "big picture."

Having also developed shipboard hull-mounted sonars, variable-depth sonars, and a fully automated drone launch and retrieval system, the firm has devised SAMDIS primarily to be deployed from unmanned underwater vehicles (UUVs) and unmanned surface vehicles (USVs), i.e., the so-called "ghost fleet."

However, the system in a towed configuration with a different form factor called T-SAM (Towed-SAMDIS) can be deployed from unmanned surface vessels, and it can be deployed and towed in seas up to sea state four.

The SAMDIS multi-aspect AN/ASQ-series sonar currently provides the only technology that can detect and classify sonar echoes in a single sweep and can collect bathymetry and seafloor imagery simultaneously.

With respect to mine countermeasures, the operational benefit is considerable, particularly when the goal is also to define the type of device required to destroy the mine.

The SAMDIS system provides a unique capability for multi-aspect processing of ultra-high-resolution synthetic aperture sonar capability. This multi-aspect photography capability enables it to simultaneously examine an object on the seabed from three different viewing angles, hence greatly increasing the search rate.

It is also able to provide for single-sweep detection and determination for on-the-fly, real time intelligence of the seabed.

And, SAMDIS can produce images with far better resolution and contrast than the previous generation of sonar imaging technology currently in use today by many Navies.

This maximizes detection and classification effectiveness, minimizing the number of false alarms—one of the major challenges of mine-detection systems—SADMIS users will be able detect and, if necessary, clear mines more rapidly than with older methods.

While mine countermeasures is a concern of many allied nations, SADMIS also has direct value in several other areas of undersea warfare and surveillance operations such as "intelligence preparation" of the environment.

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Real-world Experience

SAMDIS has been in production for four years and is in operational service with several allied nations.

In particular, Britain and France employ SADMIS in their joint mine countermeasures program. The system is software upgradable, which means that experience with the now deployed and operational systems can easily provide data for software upgrades of contemporary as well as future versions.

Also, because SAMDIS is platform agnostic and scalable, it can be deployed on a variety of current and future platforms. Although especially configured for deployment from unmanned underwater vehicles, it can be deployed from unmanned surface vehicles.

These could be hosted by the U.S. Navy's littoral combat ships (LCS) or other naval or commercial ships of opportunity.

In October 2016, GPS World reported on the results the multinational Unmanned Warrior exercise.

"These systems can help protect our Sailors and Marines from some of the Navy's dull, dirty and dangerous missions, like mine countermeasures," according to the U.S. Chief of Naval Research Rear Admiral Mat Winter. "

"Additionally, these systems can increase our capabilities at a more affordable cost of the conventional systems we currently employ."

The "Ghost Fleet"

In February 2017, Defense News reported that the Navy was working to develop quickly a "ghost fleet" of numerous surface, air and undersea drones that would synchronize a wide-range of combat missions without placing sailors and Marines at risk. Captain Jon Rucker, program manager for unmanned maritime systems in the LCS program outlined top-level requirements: "We want to have multiple systems teaming and working together, surface, air and undersea."

Rucker explained that the Pentagon and the Navy are advancing this drone-fleet concept to search and destroy mines, swarm and attack enemies, deliver supplies and conduct, reconnaissance and surveillance missions, among other tasks. These capabilities could operate in a combat environment with little or no human intervention after being programmed for the specific role.

Defense News noted that the Navy's Office of Naval Research has been working closely with the Defense Department's Strategic Capabilities Office to fast track this technology into an operational service.

Dr. William Roper, the DOD capabilities director, explained that much of this effort involves merging new platforms, weapons, and technologies with existing systems in a way improves capability while circumventing a lengthy and often bureaucratic formal acquisition process.

For example, USVs and UUVs configured for MCM search, detect, localize, classify, identify, and neutralize/exploit tasks could take advantage of the "off-the-shelf" SAMDIS system, which already has been demonstrated in Navy tests.

In addition to autonomous operations by a UUV with SAMDIS, a tow-configured SAMDIS could deploy from the in-development Common Unmanned Surface Vehicle (CUSV).

And in that regards the Arctic is an area of growing interest.

UUVs equipped with SAMDIS can have a key role in helping the U.S. Coast Guard to conduct its missions in this vital economic, security and defense area of interest.

As Admiral Paul Zukunft, U.S. Coast Guard Commandant, explained: "It would make sense for UUVs to be part of the Coast Guard's future, and we would start with the Arctic as a key area for such operations, to gain enhanced situational awareness in the region."

A True Breakthrough

SAMDIS represents a true breakthrough in mine countermeasures, a sector that previously was the exclusive preserve of specialized minecraft with hull-mounted sonars and dedicated mine-hunting helicopters.

The system provides a new approach to undersea warfare, particularly MCM, permitting a variety of platforms to employ SAMDIS to give an almost holistic picture of the seabed area.

This could be particularly significant in coastal areas, where there are seafloor wrecks and other objects that could confuse other acoustic systems.

The Advanced Acoustics/Thales team looks to have an affordable, effective solution for defeating our adversaries' mines in some future crisis or conflict.

U.S. Navy demonstrations and tests have confirmed SAMDIS operational capabilities, while four allied navies have also reported meeting operational requirements.

"A mine is a terrible thing that waits," Dr. Truver reminds us. With SAMDIS the U.S. Navy needs to wait no longer for cost-effective and proven underwater sensors for mine countermeasures and other important undersea warfare tasks.

http://www.sldinfo.com/new-underwater-effectiveness-the-samdis-solution/

In a recent interview, a senior US Naval officer underscored that the US acquisition process is so slow that the training process was crucial to ensuring that the US had a combat advantage. It is hard to train on what you do not have; by leveraging operating foreign navy solutions and training on them, the US Navy could enhance its combat advantage, rather than waiting for the Slo Mo US defense acquisition process.

Second is the question of getting on with regard to the weapons revolution. Rebuilding the stockpile of current weapons is a key priority but while doing so allied weapons could be adopted as the "new investments" to the inventory while the DoD sorts through how to get on with longer range weapons and higher speed weapons to enhance the high intensity Warfighting capabilities of the US and allied forces.

One example is the Joint Strike Missile which is designed for attack on surface ships flying off of an F-35 and will be used initially by the Norwegians (who have developed it) and the Japanese and Australians. As it already will be launched on an F-35A, the US can simply by it as part of the inventory upgrade effort.

Another example is provided by the MBDA missiles coming on line for the F-35 . Weapons such as Meteor for air-to-air or Spear 3 for ground attack from an F-35 are in the works and could be included as well in any inventory build up.

The key role of allies in F-35 can simply miss the point that the global enterprise provides a unique mobilization opportunity for US and allied forces.

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The coming of the F-35 provides a significant opportunity to leverage the investment efforts of core allies as is happening in the UK with 5th Gen weapons such as Meteor and SPEAR 3:

F-35 as a global enterprise – the 9-Nation MOU encourages US allies in the program to invest in core capabilities for the benefit of the JSF partnership – Meteor and SPEAR 3 are examples of this;

F-35 is the bedrock for high end warfare and 5th generation weapons such as Meteor/SPEAR 3 will help maximize coalition capabilities with direct benefit to the US services in the joint fight;

The integration of 5th Gen weapons such as Meteor onto 4th Gen platforms also enables the allies to better utilize their whole combat air force, not just their 5th Gen platforms.

For the US, this path opens up a number of options; one example is the potential interoperability of UK and USMC F-35Bs afloat where jets would be able to fly from each other's decks with whichever weapons are to hand. It could go a step further and open up a scenario where the US consider adopting these new weapons onto US F-35s, which share integrative commonality with allied F-35s.

The United States could thus leverage allied investments in the weaponization of the global F-35 in a significant way, but not if it follows a protectionist policy or continues to pursue the legacy of the most recent Administration's legacy to often have competition for competitions sake rather than simply moving ahead with the off the shelf solution.

Allied weapons integration on the F-35 provides a range of off the shelf solution sets for the US forces, which should be leveraged. The US can put its investment into additional weapons capabilities rather than simply investing in areas already covered by advanced weapons capabilities developed and deployed by allies.

The F-35 global enterprise provides a way ahead for more rapid development of weapons, by leveraging allied investments and capabilities whilst the US develops new capabilities in parallel, which can then be offered to the allied F-35 users as well. A new business model has emerged precisely when a new Administration has arrived in Washington, which has underscored its desire for new business models.

Here one is staring them directly in the face.

A third example is provided by the Wedgetail which the Aussies have made a key combat asset within the high-end force and are looking to invest in its further development. Leveraging multiple years of development and combat operations to get on with the post-AWACs world makes more sense than simply continuing the slow roll of upgrading AWACs.

For example, the Aussie Wedgetail has come to Red Flag 2017-1 and has provided advanced C2 and support to a fifth generation enabled air combat force. F-35s, F-22s and advanced legacy aircraft like Typhoons were supported throughout by the most advanced air battle management system operating today.

And it is being operated by the RAAF and not the USAF; and the RAF is also considering its acquisition. Instead of slow rolling an upgrade of AWACS, it is time to leap ahead and move beyond the 360 degree radar dome technology and embrace a very different concept of air battle management, one good for today and one very integratable into the tron warfare and distributed operations of the future.

A fourth example which would clearly roil the protectionist who care more about protectionism than the capability of an actual deployed US military force would be to get on with the KC-10 replacement and by the A330MRTT. Not only does the USAF have NO operational new tankers, but the allies have proven beyond a shadow of a doubt that the USAF made the right decision picking this aircraft over the Boeing

offering. But the Boeing plane is clearly the KC-135 replacement; but the KC-10 which has become a key tanking asset in the absence of a new tanker, has demonstrated what a larger tanker can do for a deployed force.

And the allies are operating multiple A330MRTTs so that commonality has already been established and significant investments by ALLIES in a needed US capability already in place.

For example, the Aussies are about to add an operational autonomous boom to their KC-30As.

According to the RAAF Commander in charge of lift and tanking:

"If it can anticipate and react to movements of the receiver aircraft faster than the boom operator can, then you end up with faster contacts.

You also potentially end up with more consistent contacts when the turbulence level increases, in cloud or when night falls."

The Aussies are moving onto Tanker 2.0 while the USAF is waiting for Tanker 1.0. This makes no sense.

Recently, the Minister of Defence for the UK made the argument for the US opening the aperture with regard to non-US systems. But one could argue that it is not simply a question of trade policy – it is about getting serious about rapidly equipping a US combat force which needs to prepare for the certainty of high intensity combat.

CRAFTING A 21ST CENTURY COMBAT FORCE: AIR MARSHAL (RETIRED BROWN) FOCUSES ON THE CHALLENGE FOR THE UNITED STATES

By Robbin Laird

Shifting from a primary focus on the counterinsurgency focused land wars of the last 15 years to shaping a high intensity combat force, which can prevail against peer competitors, is a significant challenge for the United States and its closest allies. A key dynamic within this effort is the crucial opportunity the US and its closest allies have from cross learning because a number of the core systems being stood up to achieve the kinds of combat effects which is needed are being procured at the same time. Key allies have also put in play concepts of operation in advance of the United States; ironically, often with systems derived from the efforts of key US defense firms.

The F-35, P-8, Triton and Growler are all being stood up by the United States and by our closest allies, notably Australia. Norway is also drawing upon this interactive modernization process to stand up its own 21st century combat force.

At the same time, the Wedgetail and the KC-30A have been deployed for some time and are cutting edge systems NOT to be found in the US inventory. Additionally, the RAF is modernizing its Typhoons with long range strike systems complementary to their F-35s prior to the US having made similar adjustments to its own legacy aircraft.

There is no ambiguity in the UK or Australian minds about the shift to fifth generation warfare as opposed to having lingering debates about remaining mired in a last generation mentality.

There is little question that key elements of the USMC, USN, USAF and US Army are working to drive a transition; and they are aided and abetted in this process by core allies. It is not a question of selling systems

to these allies AFTER the US has shaped a new strategy and a new capability; it is about reshaping in an interactive transformation process.

The problem for the United States is that a legacy defense acquisition system and barriers to effective transformation remain in being. We are still pursuing AWACS modernization when Wedgetail has demonstrated a clear 21st century alternative; and the global fleet of Airbus 330MRTT tankers are reality; with NO new tankers flying in the USAF and flying the second choice for the USAF is a limiting factor.

It is crucial for the United States to tap the new systems and develop new concepts of operation to capitalize on the new force; yet the legacy acquisition and stove piped service dominated systems limits the potential for the United States.

How has this happened?

During a visit to Australia earlier this year, I participated in a Williams Foundation seminar that was debating in public (and without doing so it will be difficult to gain the broad support necessary for transformation) how best to build an integrated joint force from the ground up. No one is deluded that this will be difficult; but if you don't set the objective when you are buying software upgradeable systems, which have an inherent potential for interactive modernization, and force transformation you are not going to get there.

When you are left with things like a 2030 AWACS modernization focus, or a Super Hornet versus F-35 conversation, or keeping a A-10 tank killer designed 40 years ago, it is difficult to boldly lead a transformation effort.

After the seminar, I had a chance to discuss the challenge with Air Marshal (Retired) Geoff Brown and to get his thoughts on the challenge facing the United States. To be clear, the crucial working role between cutting edge professional military and the Aussies is crucial to the Aussie transformation effort. That is not in question; what is in question is the capability of the United States to make the leap forward with the service dominated and legacy acquisition system and the constant constraints which Congress has placed upon the dramatic change which the US military needs to make to defend the United States and to compete effectively with peer competitors.

According to Brown, "the systems are all there in the United States. The shoots are there for fundamental change. But the legacy approach is like a giant tree blocking out the sun for the shoots to grow."

He pointed out that the notion that one would modernize AWACS is "simply amazing to me. With the fuel savings alone from replacing the AWACS fleet with Wedgetails a new fleet could be paid for in a few years. But that in the US system it is difficult to get a tradeoff from keeping the old legacy systems running and simply shutting them down; putting the new systems into the force; and leveraging them rapidly.

The new systems require new sustainment approaches. "The F-35 provides a great opportunity for a very different sustainment system but with the Congressional mandated depots the opportunities for an innovative industrial-government partnership are severely constrained."

As the Trump Administration looks to rebuild the force if the fundamental barriers are not addressed, "even 50-60 billion dollars more won't correct the kinds of logistical shortfalls which the United States faces. I'm a little frightened for the future if the US forces keep going down the path they're on at the moment. Just wishing that additional money will be available to operate the legacy force structure isn't going to solve the problem. The current funding issues and congressional limitations placed on the Services will drive the US towards and increasingly hollow force.

He sees a significant opportunity to unlock potential by shaping new logistical approaches such as evident in the C-17 support model.

There are green shoots all over the United States. The United States is the most innovative society in the world, without a doubt. One green shoot is the C-17 support model. By using a very innovative industrial working relationship with the deployed force, support costs are going down, not up. So why not adopt this model for the new force being built. We certainly are going to focus on that with P-8 and F-35. The US logistical support system and the congressional mandated Title 10, 50:50 requirement to protect government Depots severely hampers and constrains the services and has a significant impact on their force readiness."

He added "You've just got to invest in the new systems and follow their logic and prioritize it above everything else and be prepared to cut away things that don't make sense in the future. You should cut away half the stuff that you needed for Iraq in Afghanistan because you're not going to fight like that in a world of peer competitors. It is like the Nike slogan: Just do it."

Other core allies have noted what Brown is talking about, and I have heard that from those allied militaries in my global travels. To take one example, a senior RAF officer who flew in Red Flag 17-1 noted "he would never wish to fly with an AWACS if he had a Wedgetail. The AWAC constrains; the Wedgetail supports of fifth generation force."

And the Aussie tanker has had dispatch rates and performance metrics off the charts compared to the current crop of USAF tankers.

Lt Gen (Ret) David A. Deptula, who has a been a proponent of rapidly moving toward new concepts of operation enabled by fifth generation aircraft, supports Brown's points, "We have all the capabilities necessary to dramatically improve our warfighting capacity, we just have to gather the will to apply them in new ways unencumbered by paradigms of the past."

In short, we can learn from allies. If we want to make America great again, ironically the path goes through working on an across the board transformation of US force interacting with cutting edge allies.

ALLIES AND 21ST CENTURY WEAPONS SYSTEMS: THE CASE OF THE COMING OF THE F-35 TO EUROPE

A key dynamic with the shift from the land wars to shaping a 21st century combat fore is the crucial opportunity the US and its closest allies have to learn from each other thanks to the number of core weapons systems being bought at the same time. Almost hidden in plain view is the emergence of a significant driver of change –-flying the same aircraft at the same time, and cross learning from each other.

A case in point is the F-35. There was much recent press on the arrival of USAF F-35s in Europe, landing at RAF Lakenheath and operating from there and then some of those aircraft going to Estonia and then Bulgaria. SACEUR himself showed up at RAF Lakenheath and underscored how significant the arrival of these aircraft was for a training mission in Europe.

For example, in an article by Robert Wall entitled "US jet fighters flex muscle amid Russia tensions" published in *The Wall Street Journal*, the arrival of the USAF jets in the UK and in Europe is highlighted. It is noted that the U.S. does not intend to permanently deploy the jets in Europe until 2020, and that "several allied air forces, are also buyers."

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But missing in plain view or perhaps plane view is the reality of the F-35 global enterprise being laid down prior to the arrival of any permanent U.S. deployment, and that global enterprise is being laid down by allies, not the U.S. simply by itself.

To take the key case, look at the United Kingdom. Hidden in plain view is the fact that the UK is standing up its F-35 base PRIOR to the United States. And that the first squadron for the UK and Australia for that matter is being trained and equipped in the United States prior to their arrival in each of their countries. This is a case of the pilots and maintainers learning common approaches from the ground up PRIOR to standing up the new F-35 bases.

And not only that, but the facilities being established in Europe can provide a key sustainment and operational enterprise which the US as well as allies can leverage in common. Or put bluntly, the U.S. if its follows an innovative sustainment model can gain significant savings and operational advantages from leveraging the European infrastructure, rather than flying in parts and other materials to support ITS jets. The impact of savings to the lift and tanking fleet for the USAF could be very significant indeed from coming up with a 21st century approach to sustainment, support and sortie generation.

It is not just about the US sending advanced jets to Europe; it is about the US being smart enough to embed its jets in a broad scale renorming of airpower associated with the coming of the F-35 to a significant part of the allied combat fleet at virtually the same time.

The F-35 is a data rich aircraft and needs to see a 21st century basing infrastructure built to support it as is the case of with some other aircraft like Wedgetail, P-8 and Triton. The UK and the US are rebuilding in common their respective bases from which they will operate their F-35s.

At Marham, there is a staff of 17 at the Lightning Force headquarters supporting the operational standup with nine specifically focused on the infrastructure aspects. They are busy simply in order to have the base ready next year to receive their first contingent of F-35Bs from their current base, which is in the United States.

The base will have a fully operational, training and support capability. Training, maintenance and various centers are being stood up. At the heart of the effort will be the National Operations Center in which logistics and operations are collocated and the U.S. will have personnel in this center as well.

There are multiple synergies involved with the F-35 and the standup of the Marham Air Base, two of which highlight the US-UK working relationship. The first is the synergy from America to the United Kingdom and back again. The UK has operators at Pax River, Edwards, Eglin and Beaufort Marine Corps Air Station. The planes coming from Beaufort will provide the standup for the first RAF squadron, namely,. 617 squadron.

The second synergy is between the standup among bases and lessons learned. Marham is being stood up and generating operational lessons learned back to the United States, both in terms of the U.S.'s standup of its own bases abroad and at home, and, notably in terms of shaping a new operational dynamic for RAF Lakenheath.

The USAF F-35s at Lakenheath can become integrated into the operational, training and support elements in the UK as well, shaping a new approach for the USAF as well.

As Wing Commander Butcher, the CO of 617 Squadron, underscored the possibilities:

"We want to take forwards everything that we've done in the pooling and implementation agreement in the United States, and try and see how we can transpose that into a UK model.

"We're looking to have jets taking off, F-35A's taking off at Lakenheath. Well, what if they have an issue and they need to land in Marham. Rather than take the time to move people, spares etc from Lakenheath up to here, what's to say that we couldn't conceptually have some maintainers from 617 Squadron repair the jet, sign off, send it flying again.

"Lakenheath is going to be busy base with the closure of Mildenhall. Increased efficiencies working with us would make sense.

"Could we potentially have F-35As operating out of Marham on a daily basis?

"How do we organize hot pit operations on each other's base?

"One can easily see how that could buy you a lot of combat flexibility, in terms of how you might do maintenance operations."

And at RAF Lakenheath, the synergies underway are obvious as well. According to Col. Evan Pettus, the Commander of the 48th Fighter Wing at Royal Air Force Lakenheath, England:

"We do not have a closer partner than the UK. We will both operate the F-35 from Marham and Lakenheath respectively, which are very close to one another.

"Shaping synergy between the two bases is clearly an important objective. We are working this process in a step-by-step manner, from understanding how we might operate F-35As from Marham and F-35Bs from Lakenheath, to deeper sustainment and training opportunities as well."

But the potential is even greater for synergy from the two bases working together across the region. According to then Col. Novotny, the 48th Fighter Wing Commander, and now General Novotny at the Air Combat Command.

"We are not flying alone; but joined at the hip. We will be flying exactly in the area of interest for which the plane was designed and can fly together, maintain together, and operate together leveraging the air and sea base for which the F-35 B will fly from as well. It is a unique and strategic opportunity for the USAF and for the nations."

General Novotny added that the two bases joined at the hip can provide a key strategic impact as well. "As we get this right, we can bring in the Danes, the Norwegians and Dutch who are close in geography and the Israelis and Italians as well to shape the evolving joint operational culture and approach. Before you know it, you've got eight countries flying this airplane seamlessly integrated because of the work that Lakenheath and Marham are doing in the 20 nautical miles radius of the two bases."

The RAF, the RAAF, the USAF and the USMC are already learning how to integrate the F-35 into the air combat force at Red Flags, and recently have included the French Air Force in a Langley trilateral training exercise. But integration will be accelerated by the integration of normal operations from common bases throughout the European region as well.

As Novotny put it: "Doing Red Flags requires bring forces to Nellis and expending monies to come to the exercise, clearly an important task notably in learning to fly together in high intensity warfare exercises. But what can be shape from the RAF Marham and Lakenheath bases is frequency of operations with core allies flying the same aircraft."

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"The same aircraft point can be missed because the UK did not fly F-16s, the Norwegian, the Danes and the Dutch do. And the USAF does not fly Typhoons and Tornados; the UK does. Now they will ALL fly the same aircraft."

"I did two OT assignments and we worked to get into Red Flag when we could to do joint training. Here we can do that virtually every day. We reach the Dutch training airspace, and can work with the Dutch, with the Brits, with the Germans, with Typhoons, with F3s, with the NATO AWACS. We take off and we fly 30 minutes to the east and we make it happen. It is Red Flag as regular menu; rather than scheduling a gourmet meal from time to time."

And it is not only European allies who can engage in the cross learning. The Aussies and the Dutch are standing up their F-35s at about the same time, and cross learning between the Aussies and the F-35 European enterprise is clearly already underway based on my interviews in Australia as well.

In short, the UK is leading the way in shaping a new infrastructure for a 21st century air combat force and with its operational footprint at RAF Lakenheath, the USAF is well positioned to interact with this dynamic of change. With the RAF and the USAF setting up four squadrons of F-35s between them at two nearby RAF bases, there is a clear opportunity to shape a common sustainment solution.

And the impact of so doing could be significant on the North Sea neighbors, namely, the Danes the Norwegians and the Dutch. This is clearly a key way ahead in building out NATO capabilities going forward, which provides a 21st century example of burden sharing which delivers relevant capabilities.

ALLIES AND 21ST CENTURY WEAPONS: THE MARITIME DOMAIN STRIKE ENTERPRISE

By Robbin Laird Recently, the UK, Norway and the US signed an agreement to work together on ASW in the North Atlantic, which will leverage the joint acquisition of the P-8 aircraft. This agreement and the evolution of the aircraft is yet another example of the US and its allies standing up at the same time an evolving defense capability in which allies are clearly key partners in shaping the evolution of a core combat capability.

The P-8s is part of a cluster of airplanes which have emerged defining the way ahead for combat airpower which are software upgradeable: the Australian Wedgetail, the global F-35, and the Advanced Hawkeye, all have the same dynamic modernization potential to which will be involved in all combat challenges of maritime operations.

It is about shaping a combat learning cycle in which software can be upgraded as the user groups shape real time what core needs they see to rapidly deal with the reactive enemy. All military technology is relative to a reactive enemy. As Ed Timperlake has noted "It is about the arsenal of democracy shifting from an industrial production line to a clean room and a computer lab as key shapers of competitive advantage."

http://www.sldinfo.com/the-arrival-of-a-maritime-domain-awareness-strike-capability-the-impact-of-the-p-8triton-dyad/

And from the ground up, the US Navy is doing this with the Brits, the Australians, and the Norwegians. And clearly, there is a need for Canada to sort out a way to join in the effort given its geographical location and the threats, which the United States and the allies face in common.

Much like the F-35 pilots and maintainers for allies are being trained initially in the United States and then standing up national capabilities, the same is happening with the P-8/Triton allies whereby the Brits and Australians are training at Jax Navy and this will most certainly happen with the Norwegians as well. In fact, recently an RAF pilot has gone beyond 1,000 flight hours on the P-8 at Jax Navy. And the allies are doing training for the entire P-8 force as well. The Australians are buying the P-8 and the Triton and the Brits and Norwegians the P-8s but will work with the US Navy as it operates its Tritons in the North Atlantic area of interests.

These allies are working key geographical territory essential to both themselves and the United States, so shared domain knowledge and operational experience in the South Pacific and the North Atlantic is of obvious significance for warfighting and deterrence. And given the relatively small size of the allied forces, they will push the multi-mission capabilities of the aircraft even further than the United States will do and as they do so the U.S. can take those lessons as well.

There is already a case in point. The Australians as a cooperative partner wanted the P-8 modified to do search and rescue something that the US Navy did not build into its P-8s. But now that capability comes with the aircraft, something that was very much a requirement for the Norwegians as well. And the US Navy is finding this "add-on" as something of significance for the US as well.

I have visited the Australian and British bases where the P-8s and, in the case of the Aussies, the Triton is being stood up. And I have talked with the Norwegians during my visit in February about their thinking with regard to the coming MDA enterprise. It is clear from these discussions, that they see an F-35 like working relationship being essential to shaping a common operational enterprise where shared data and decision making enhance the viability of the various nation's defense and security efforts.

During my visit to RAAF Edinburgh, which is near Adelaide in South Australia where the Aussies will build their new submarines, I had a chance to discuss the standup of the base and to look at the facilities being built there. As with the F-35, new facilities need to be built to support a 21st century combat aircraft where data, and decision-making tools are rich and embedded into the aircraft operations.

At the heart of the enterprise is a large facility where Triton and P-8 operators have separate spaces but they are joined by a unified operations center. It is a walk through area, which means that cross learning between the two platforms will be highlighted. This is especially important as the two platforms are software upgradeable and the Aussies might well wish to modify the mission systems of both platforms to meet evolving Australian requirements.

Second Line of Defense

And in discussions with senior RAAF personnel, the advantage of working with the US Navy and other partners from the ground up on the program was highlighted.

"In some ways, it is like having a two nation F-35 program. Because we are a cooperative partner, we have a stake and say in the evolution of the aircraft.

And this is particularly important because the aircraft is software upgradeable.

This allows us working with the USN to drive the innovation of the aircraft and its systems going forward."

"We've been allowed to grow and develop our requirements collectively. We think this is very far sighted by the USN as well. I think we've got the ability to influence the USN, and the USN have had the ability to influence us in many of the ways that we do things."

"We will be doing things differently going forward. It is an interactive learning process that we are setting up and it is foundational in character. We're generating generation's worth of relationship building, and networking between the communities. We are doing that over an extended period of time."

"For about three years we have been embedding people within the USN's organization. There are friendships that are being forged, and those relationships are going to take that growth path for collaboration forward for generations to come. When you can ring up the bloke that you did such and such with, have a conversation, and take the effort forward because of that connection. That is a not well recognized but significant benefit through the collaborative program that we're working at the moment."

"We are shaping integration from the ground up. And we are doing so with the Australian Defence Force overall."

I visited RAF Lossiemouth as well where the Brits are standing up their P-8 base. With the sun setting of the Nimrod, the RAF kept their skill sets alive by taking Nimrod operators and putting them onboard planes flying in NATO exercises, most notably the Joint Warrior exercises run from the UK. This has been a challenge obviously to key skill sets alive with no airplane of your own, but the US and allied navies worked collectively as the bridge until the Brits get the new aircraft.

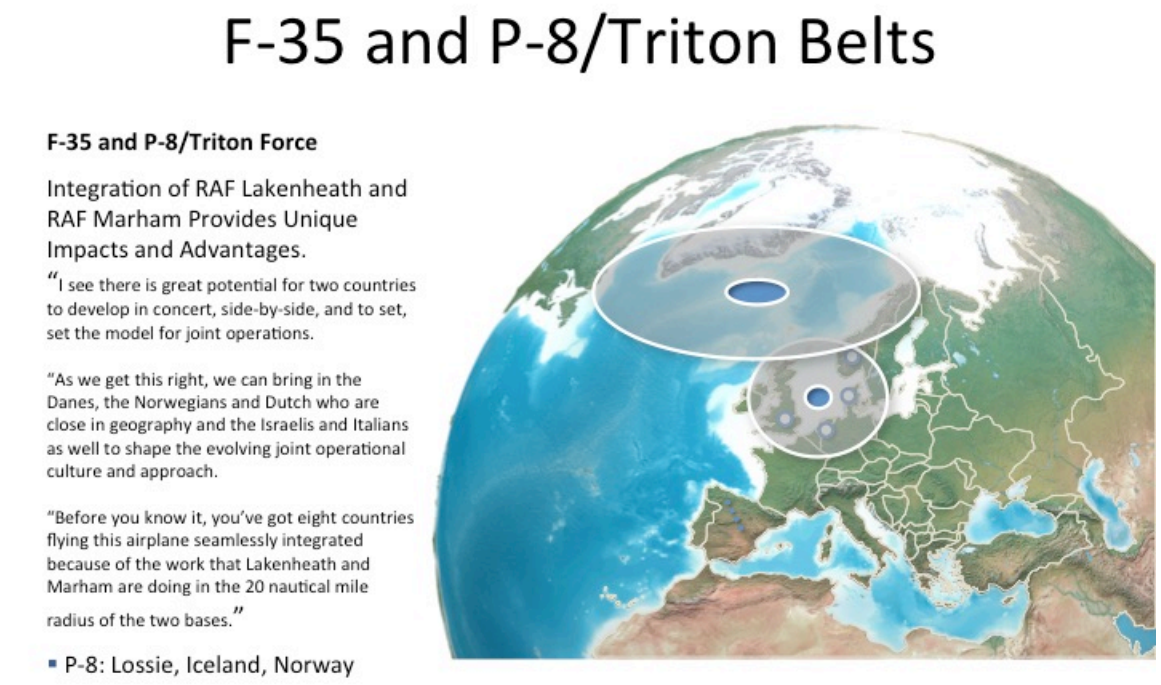
http://www.sldinfo.com/keeping-skill-sets-alive-while-waiting-for-a-replacement-aircraft-from-nimrod-to-p-8/

And the base being built at Lossiemouth will house not only UK aircraft, but allow Norwegians to train, and the US to operate as well. Indeed, what was clear from discussions at Lossie is that the infrastructure is being built from the ground up with broader considerations in mind, notably in effect building a 21st century MDA highway. The RAF is building capacity in its P-8 hangers for visiting aircraft such as the RAAF, the USN, or the Norwegian Air Force to train and operate from Lossiemouth. In many ways, the thinking is similar to how building the F-35 enterprise out from the UK to Northern Europe is being shaped as well.

http://www.sldinfo.com/the-p-8-coming-to-raf-lossiemouth-shaping-the-infrastructure-for-uk-and-nato-defense-in-the-north-atlantic/

In effect, an MDA highway being built from Lossie and the F-35 reach from the UK to Northern Europe are about shaping common, convergent capabilities that will allow for expanded joint and combined operational

capabilities. At this is not an add on, but built from the ground up.



Flying the same ISR/C2/strike aircraft, will pose a central challenge with regard to how best to share combat data in a fluid situation demanding timely and effective decision-making?

The UK is clearly a key player in shaping the way ahead on both the P-8 and F-35 enterprises, not just by investing in both platforms, but building the infrastructure and training a new generation of operators and maintainers as well. At the heart of this learning process are the solid working relationships among the professional military in working towards innovative concepts of operations. This is a work in progress that requires infrastructure, platforms, training and openness in shaping evolving working relationships.

Having visited Norway earlier this year and having discussed among other things, the coming of the P-8 and the F-35 in Norway, it is clear that what happens on the other side of the North Sea (i.e., the UK) is of keen interest to Norway. And talking with the RAF and Royal Navy, the changes in Norway are also part of broader UK considerations when it comes to the reshaping of NATO defense capabilities in a dynamic region.

In my interview with the new Chief of Staff of the Norwegian Air Force, Major General Skinnarland, she underscored how important she saw the collaborative from the ground up approach of operating new systems together.

Referring to the F-35, she argued that "With the UK, the US, the Danes and the Dutch operating the same combat aircraft, there are clear opportunities to shape new common operational capabilities… And with the P-8s operating from the UK, Iceland, and Norway can shape a maritime domain awareness data capability which can inform our forces effectively as well but again, this requires work to share the data and to shape common concepts of operations.

Second Line of Defense

"A key will be to exercise often and effectively together. To shape effective concepts of operations will require bringing the new equipment, and the people together to share experience and to shape a common way ahead."

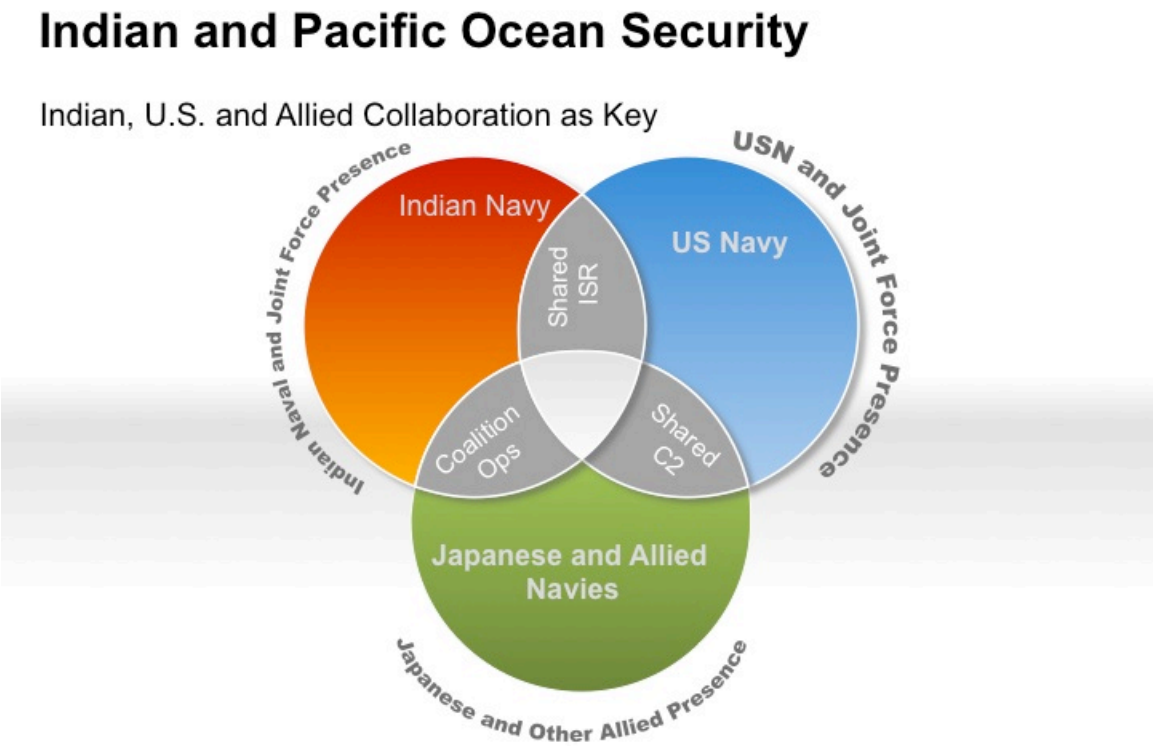
In effect, a Maritime Domain Awareness highway or belt is being constructed from the UK through to Norway. A key challenge will be establishing ways to share data and enable rapid decision-making in a region where the Russians are modernizing forces and expanded reach into the Arctic.

Obviously a crucial missing in action player in this scheme is Canada. And in my discussions with Commonwealth members and Northern Europeans there is clear concern for disappearing Canadian capabilities.

Perhaps one way to generate a way to keep ASW skills alive while Canada works towards 21st century systems might be for Canada to join up with the UK and Norway to procure a set of Tritons in common and work common data sharing arrangements. Perhaps a model to sell data rather than buy aircraft might be considered as well which has been the model whereby Scan Eagle has operated with the USMC.

As the COS of the Norwegian Air Force put the challenge:

"We should plug and play in terms of our new capabilities; but that will not happen by itself, by simply adding new equipment. It will be hard work."



And that will include the possibility of an expanded relationship with India as well. The Indians have purchased P-8s as well but have put unique systems on the aircraft to do many of the missions. There is an inherent potential for India to work with the other P-8 partners as well but full cooperation will require reaching a number of data sharing agreements with the other P-8 partners.

In effect, the P-8 will be part of the evolving naval collaborative framework between the Indians and the U.S. as well as with other allies. What makes the P-8 an especially interesting platform is that it is a shared platform between India and the U.S. with others (such as Australia) likely to join in and this sharing of a platform can provide a tool for enhancing collaboration in the daunting task of shaping effective ISR for 21st century maritime missions.

The opportunity is inherent in the technology; the challenge will be to shape the collaborative approach and shared concepts of operations. The threats require nothing less.

GETTING ON WITH THE WEAPONS REVOLUTION

Notably with the coming of the F-35 weapons developed by allies for their aircraft are vailable almost as an app for the U.S. forces. The business case for buying apps rather than launching a long development program is compelling.

The cases of the Joint Strike Missile and various MBDA missiles developed or being developed for the F-35B certainly are illustrations of the strategic opportunity.

The Norwegian Deputy Defense Minister on Reshaping Norwegian Defense: Meeting 21st Century Challenges

Prior to attending the Norwegian Airpower Conference in Trondheim, I was able to meet with Mr. Øystein BØ, the State Secretary and Deputy Defense Minister at the Norwegian Ministry of Defense to discuss his perspective on the way ahead for Norway and NATO in the Northern region.

A key point that he underscored was the importance for NATO states to invest in defense and to innovate in delivering new capabilities.

“Article III is the obligation to have a strong national defense and to be able to be a net contributor to security.

There is no free ride in NATO, we’ve all got to do our part to be able to defend each other.”

Put bluntly, the situation facing Norway is challenging as the Russians are modernizing and exhibiting a more assertive and less predictable behavior.

In a conference held in Oslo last year, Norwegian speakers underscored their concern with the need to take Arctic security and defense seriously.

“A strong NATO presence in the North is in the US’ and Norway’s interest”, said Øystein Bø, State Secretary of the Norwegian Ministry of Defense at the event.

Bø specifically pointed to the new security environment in Europe after Russia’s actions in Ukraine, and the increasing human activity in the Arctic. Norway has for a long time pushed to strengthen NATO’s maritime capabilities, especially in the North Atlantic.

Second Line of Defense

Ahead of the Warsaw Summit this year, Norwegian Minister of Defense Ine Eriksen Søreide wrote in a statement "NATO needs a coherent and robust long-term strategy to deal with the new security environment. A key element of that strategy must be maritime power and presence in the North".

State Secretary Bø underlined the need for increase in training, exercises and presence, as well as improving NATO command and control structure..

http://www.highnorthnews.com/nato-reluctant-to-engage-in-the-arctic/

In our discussion, he both underscored the importance of working with the Russians and deterring them. He argued for the need for predictability but also strengthening one's deterrent capabilities as well.

It was crucial for both Norwegian defense modernization as well as working effectively with allies in defense of the Norwegian region.

Exercises are an important tool in this effort, within NATO and with other Nordic exercises.

He noted that the Norwegian, Swedes and Finns do joint air exercises and operate from their home bases but work together in shaping collaborative air operations.

"This ensures efficiency in that the logistics are provided at the home bases; but also shaping collaborative capabilities by working together in common areas of interest in the region as well during the exercise."

The Norwegian Deputy Defense Minister Øystein BØ: Credit: Norwegian Ministry of Defense

He started the conversation by focusing on the F-35 and its potential contributions to Norwegian defense modernization.

"We do not see this just as a replacement aircraft; we see it as contributing to our ground-air-naval force modernization efforts and overall capabilities. It will interact with the Army, with the Navy and will be a platform in many ways that we believe is a game changer for us.

In other words, he sees the F-35 as a strategic asset from the standpoint of extended Norwegian defense capabilities.

An aspect of the F-35 program, which is not generally realized, is the importance of allied investments in capabilities, which can be used across the F-35 global enterprise.

In the Norwegian case, the Joint Strike Missile (JSM), which is considered a crucial asset in providing for maritime defense of Norway, is available to other NATO-allies flying the F-35 as well.

"This is a 21st century aspect of burden sharing as our investments in 'our' missile benefits all F-35 users of this missile across the globe, whether in Japan, Australia or in Europe."

"It is not money that just goes directly into our armed forces, but it's a lot of money that goes into developing capabilities that the alliance needs. It is about contributing to our joint security as well."

He focused notably upon the changing nature of Russian capabilities in the North Atlantic and the stronger focus on NATO's northern maritime flank, including the Greenland-Iceland-UK gap.

"History has returned but with new technologies necessary to deal with the challenge. Joint operation of the P-8 is certainly part of our joint response working with the US and the UK as we establish a joint operating capability."

Clearly, the goal is to maintain stability, but doing so is not simply sitting on one's hands hoping for a favorable outcome.

"We are working hard on defense modernization with our allies and at the same time clearly working for dynamic stability in the region.

But this is an evolving process."

Norway is in a crucial position. "If you look at the map, we are in a crucial position in the north.

But we are a small country, with a large geography and only five million people.

So we need to truly focus on a smart defense strategy."

And as the Deputy Defense Minister made clear throughout, the Norwegian government sees defense modernization, indeed interactive transformation with core NATO allies as well as partners in the region to provide for an effective role as stewards of the North.

Allies, Missiles and the F-35: The Case of the Joint Strike Missile

2017-06-29 During a visit to Norway earlier this year, the Norwegian Deputy Minister of Defense underscored the importance of allies building new missile capabilities for the F-35 as a coalition aircraft.

In the discussion with Mr. Øystein BØ, the State Secretary and Deputy Defense Minister at the Norwegian Ministry of Defense, the F-35 and the Norwegian JSM was discussed as follows:

An aspect of the F-35 program, which is not generally realized, is the importance of allied investments in capabilities, which can be used across the F-35 global enterprise.

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Second Line of Defense

In April 2017, the Australian Department of Defence signed on with Kongsberg to work on the JSM.

According to Australian Aviation:

Kongsberg Defence Systems has entered into a contract with Defence for the integration of a new capability in the Joint Strike Missile (JSM) worth the equivalent of $23 million.

The unique, state-of-the-art radio frequency (RF) seeker sensor developed by BAE Systems Australia will enable the JSM to locate targets on the basis of their electronic signature, Kongsberg said in a statement.

This contract is a result of an agreement between Australia and Norway to cooperate on the further development of the JSM that was announced in February 2015.

"JSM is the fifth-generation long-range precision strike missile that will be integrated for internal carriage on the F-35," Kongsberg stated. "Using a combination of advanced materials, ability to fly low, while following the terrain and using advanced passive seekers, the missile is extremely difficult to detect and stop, even for the most advanced countermeasures and defence systems."

BAE Systems stated that the signing of the contract will enable Kongsberg to continue the integration and qualification of the passive RF sensor.

"The company will provide a low-cost, lightweight and highly sensitive electronic support measure receiver for incorporation on JSM, which will feature an additional land attack and littoral attack capability, as well as a two-way communications line for target adjustment and inflight termination," BAE Systems stated.

"In its work with Kongsberg, BAE Systems has delivered a pre-production passive RF sensor for the JSM program, which was used to perform fit checks, system integration and support flight-testing in a development-standard missile."

In support of the contract, BAE Systems will supply new sensors to Kongsberg for use in its qualification activities.

"This is a great example of niche technology being developed through government and industry collaboration that has the potential to provide long-term, sustainable exports for Australia," said BAE Systems Australia chief executive Glynn Phillips.

The company stated that the technology was developed with the support of a Defence-funded program, and that it received a grant in 2013 to help commercialise the technology.

"We are very pleased that Australia joins the development of JSM by funding the integration of the RF seeker, and that we together can increase the JSM capabilities," said Eirik Lie, president of Kongsberg Defence Systems.

Now Japan is moving forward in considering JSM for its own F-35s as a land attack and naval attack component for its air combat force.

According to a June 26, 2017 article published by Yomiuri Shimbun, the Japanese Government mulls equipping F-35s with air-to-surface missiles.

The government is considering equipping cutting-edge F-35 stealth fighters with air-to-surface missiles, which are capable of striking remote targets on land, and plans to deploy these fighters to the Air Self-Defense Force, The Yomiuri Shimbun has learned.

It will become the first introduction of such missiles for the Self-Defense Forces. The government hopes to allocate relevant expenses in the fiscal 2018 budget, according to sources close to the government. The main purpose of

the introduction is to prepare for emergencies on remote Japanese islands, while some experts believe the government is also eyeing possession of the capability of attacking targets such as enemy bases for the purpose of defending the country.

According to the sources, F-35 fighter jets that will replace the ASDF's F-4 fighter aircraft are employed by U.S. forces and others. The F-35 aircraft has an advanced stealth capability that makes the aircraft less visible on enemy radar. The ASDF plans to introduce a total of 42 units of the F-35 and gradually deploy them to the Misawa Air Base in Aomori Prefecture starting at the end of this fiscal year. The government is considering introducing some additional capabilities for the aircraft.

The most likely option the government is currently focusing on is the Joint Strike Missile (JSM) that is being developed mainly by Norway, which also participated in an international project to develop the F-35. The ASDF currently has no air-to-surface missile capabilities, but the JSM has both air-to-ship and air-to-surface capabilities, with an estimated range of about 300 kilometers.

The Defense Ministry is building up national defense systems to defend remote islands, such as the Nansei Islands. In addition to deploying new Osprey transport aircraft to the Ground Self-Defense Force, the ministry plans to create an amphibious rapid deployment brigade, similar to other nations' marines.

As an air-to-surface missile has a long range, it is possible to effectively strike a target from safe airspace. For this to be possible, the ministry decided it was necessary to consider introducing the JSM to prepare for situations such as preventing foreign military vessels from approaching remote islands or the SDF launching an operation to regain control of an occupied island.

Meanwhile, if the F-35 aircraft with an advanced stealth capability is equipped with long-range air-to-surface missiles, it will effectively be possible to use the F-35 to attack bases in foreign countries.

The government has said that the Constitution allows Japan to possess the capability of striking enemy bases, but the nation does not actually possess the capability as its political decisions have been based on an exclusively defense-oriented policy.

If Japan introduces air-to-surface missiles, it could prompt opposition from neighboring countries. Therefore, the government is believed to be seeking the understanding of those countries by explaining that it does not intend to use the capability to attack enemy bases, but to defend remote islands.

However, with North Korea continuing its nuclear and missile development programs and repeatedly conducting provocative actions, there are growing calls for the government to possess the capability to strike enemy bases to improve Japan's deterrence.

Amid such a situation, Prime Minister Shinzo Abe has expressed on multiple occasions his intention to consider the issue. On June 20, the Liberal Democratic Party's Research Commission on Security compiled an interim report on proposals for the next medium-term defense program for fiscal 2019-23, in which it called for the government to swiftly start discussions on possessing the capability to attack enemy bases.

Norwegian Joint Strike Missile Tests at Edwards AFB

2016-11-05 According to an article published on November 4, 2016 by Kenji Thulowei, Public Affairs Office with the 412th Test Wing at Edwards AFB, the wing is in the process of conducting tests on the Norwegian Joint Strike missile, which will eventually operate from the F-35.

Second Line of Defense

One advantage of the F-35, is that a nation's missiles integrated onto "their" F-35 is integratabtle onto every one else's similar variant of the F-35.

The Australians and the Japanese have expressed interest in the missile as well as Raytheon planning to manufacture the missile in the United States as well.

EDWARDS AIR FORCE BASE, Calif. — A U.S. Air Force F-16 Fighting Falcon piloted by Maj. Jameel J. Janjua of the Royal Canadian Air Force carries a developmental test version of the Joint Strike Missile (JSM) to its release point above the Utah Test and Training Range west of Salk Lake City. When development is complete, the Joint Strike Missile is intended for use aboard the F-35 Lighting II Joint Strike Fighter. Janjua is assigned to the 416th Flight Test Squadron based at Edwards Air Force Base as part of an officer exchange program. (U.S. Air Force photo by Christopher Okula/Released)

From Norway to Australia, members from a number of allied and partner nations have come to Edwards Air Force Base to team with base units to test systems, enhance international cooperation and advance their own air force's capabilities.

At the 416th Flight Test Squadron, a team of U.S. Air Force engineers and pilots are working with Norwegian government and industry personnel in testing the Joint Strike Missile. The JSM is designed to be carried in the F-35A's internal weapons bay and is the only powered, anti-surface warfare missile to do so according to Norwegian officials, said James Cook, the 416th FLTS JSM program manager.

The JSM is an advanced missile made of composite materials and uses stealth technology. It has air intakes, fold-out wings and tail fins. The navigation system supports terrain-following flight and can be used against sea- and land-based targets.

Before it can be integrated with the F-35A, it is being tested on F-16 Fighting Falcons from the 416th FLTS. The F-16 provides an excellent platform to initially test the missile before it's transferred to the fifth-generation fighter, test managers said.

"What we're doing is conducting risk-mitigation testing with the F-16 before the JSM is integrated on the F-35," Cook said.

All tests are conducted over the Utah Test and Training Range.

"I think it's awesome to be a part of the next generational fighter while being in a legacy fighter combined test force. I'm excited to see the final outcome, which will be the culmination of all we've done here. To see it hit the target and explode the way it was planned to do," Cook said.

Along with Cook, the JSM team consists of test pilots Maj. John Trombetta and Maj. Jameel Janjua (Royal Canadian Air Force), flight test engineers Eric Biesen and Tom Smeeks and Collin Drake, project engineer.

The JSM program at the 416th is one project that falls under the squadron's European Participating Air Force Program, which Cook manages. The squadron conducts tests for European customers when requested.

According to Raytheon:

The Joint Strike Missile – or JSM – is a long-distance anti-ship missile designed to take on high value, heavily defended targets.

The long standoff range (distance from the aircraft to the target) ensures that the aircraft and pilots remain out of harm's way.

JSM has sophisticated target acquisition capability that uses Autonomous Target Recognition, made possible by an imaging infrared seeker.

It is the only fifth-generation cruise missile that will be integrated on the F-35 and also available for integration on other aircraft intended for offensive anti-surface warfare (OASuW) applications.

FEATURES

Advanced engagement planning system that exploits the geography in the area

Accurate navigation system for flight close to terrain

High maneuverability to allow flight planning in close vicinity to land masses

Discriminating seeker with imaging infrared technology

Two-way networking datalink (compliant with standard military equipment) offering target-update, retargeting and mission-abort capabilities

The Joint Strike Missile is a partnership between Raytheon Company and Norwegian defense company Kongsberg Gruppen.

Second Line of Defense

Allies and Weapons: European Industry Provides Capabilities in Shaping a Way Ahead for Fifth Generation Enabled Air Combat

2017-07-28 By Robbin Laird

The coming of the F-35 provides a significant opportunity to leverage the investment efforts of core allies as is happening in the UK with 5th Gen weapons such as Meteor and SPEAR 3:

F-35 as a global enterprise – the 9-Nation MOU encourages US allies in the program to invest in core capabilities for the benefit of the JSF partnership – Meteor and SPEAR 3 are examples of this;

F-35 is the bedrock for high end warfare and 5th generation weapons such as Meteor/SPEAR 3 will help maximize coalition capabilities with direct benefit to the US services in the joint fight;

The integration of 5th Gen weapons such as Meteor onto 4th Gen platforms also enables the allies to better utilize their whole combat air force, not just their 5th Gen platforms.

For the US, this path opens up a number of options; one example is the potential interoperability of UK and USMC F-35Bs afloat where jets would be able to fly from each other's decks with whichever weapons are to hand. It could go a step further and open up a scenario where the US consider adopting these new weapons onto US F-35s, which share integrative commonality with allied F-35s.

The United States could thus leverage allied investments in the weaponization of the global F-35 in a significant way, but not if it follows a protectionist policy or continues to pursue the legacy of the most recent Administration's legacy to often have competition for competitions sake rather than simply moving ahead with the off the shelf solution.

Allied weapons integration on the F-35 provides a range of off the shelf solution sets for the US forces, which should be leveraged. The US can put its investment into additional weapons capabilities rather than simply investing in areas already covered by advanced weapons capabilities developed and deployed by allies.

The F-35 global enterprise provides a way ahead for more rapid development of weapons, by leveraging allied investments and capabilities whilst the US develops new capabilities in parallel, which can then be offered to the allied F-35 users as well. A new business model has emerged precisely when a new Administration has arrived in Washington, which has underscored its desire for new business models.

Here one is staring them directly in the face.

There are several examples of the opportunities which represent low hanging fruit which can be leveraged.

For example, in the UK, MBDA and the three UK Armed Services have worked closely over the years, and most notably with the establishment of the Team Complex Weapons approach that has deepened their ability to work closely together.

This approach was described by MBDA as follows:

Team Complex Weapons (Team CW) defines an approach to delivering the UK's Complex Weapons (CW) requirements in an affordable manner. This value for money proposition also ensures a viable industrial capacity.

The implementation of the Team Complex Weapon's approach between Ministry of Defence (MoD) and MBDA is through the Portfolio Management Agreement (PMA), which has been independently evaluated as offering greater than £1Bn of benefit to MoD over their 10-year planning period.

The PMA aims to transform the way in which CW business is conducted by MoD with its main supplier. At the heart of this is a joint approach to the delivery of the required capability based on an open exchange of information and flexibility in the means of delivery.

http://www.mbda-systems.com/about-us/mission-strategy/team-complex-weapons/

This agreement has allowed the UK MoD to work with MBDA and other weapons suppliers to shape the evolution of capabilities in close cooperation with the operators to shape ongoing capabilities. And such an approach is absolutely central to the emergence of the next wave of weapons, namely software upgradeable ones. The developer, manufacturer and the operator have to be in a close symbiotic relationship to craft the kind of software transient advantage necessary to deal with peer competitors.

As the head of the USAF Materiel Command has put it with regard to software enabled weapons systems:

"The teams are there for life.

"I don't mean that it's one person, but we don't think about putting a team together to do the development and then push them out the door.

"That team stays with that system forever…

"We need to make the user the operational user and acceptance authority.

http://www.sldinfo.com/software-upgradeability-and-combat-dominance-general-ellen-pawlikowski-looks-at-the-challenge/

The working relationships established under Team CW have facilitated the transition to the next phase of weapons development, namely software upgradeable weapons. It has also allowed for the significant evolution of capabilities to support the land wars, notably with the transition from Brimstone to Dual Mode Seeker Brimstone.

One example is clearly the Meteor missile. It is an active radar guided beyond visual range air to air missile which offers a multi-shot capability against long range maneuvering targets. It can do so in a heavy electronic countermeasures environment at extended ranges owing to its air-breathing propulsion system

Longer range is crucial for a combat aircraft that has enhanced situational awareness with a significantly greater radar reach than the current AMRAAM, and the Meteor certainly is considerably more appropriate than the traditional AMRAAM for the F-35.

The new Meteor missile developed by MBDA is a representative of a new generation of air combat missiles for a wide gamut of new air systems. It can be fitted on the F-35, the Eurofighter Typhoon, Rafale, Gripen and other 21st century aircraft.

It is a software upgradeable missile which pairs nicely with the arrival of a software upgradeable aircraft like the F-35.

Second Line of Defense

Software upgradeability is a game changer for 21st century systems not well understood or highlighted by analysts. In the past, new products would be developed to replace older ones in a progressive but linear dynamic.

But now, one builds a core product with software upgradeability built in, and as operational experience is gained, the code is rewritten to shape new capabilities over time. Eventually, one runs out of processor power and BUS performance and needs to consider a new product, but with software upgradeability, the time when one needs to do this is moved significantly forward in time.

It also allows more rapid response to evolving threats. As threats evolve, re-programming the missiles can shape new capabilities, in this case the Meteor missile. The current production missile is believed to be using well below the maximum processing power and bus capacity of the missile. Significant upgradeability is built in from the beginning.

Although software upgradeability is not new with regard to weapon systems, the F-35 as software upgradeability is. Combining the launch of a software upgradeable aircraft with a missile designed from the ground up with upgradeability built in will allow the aircraft and the weapon to evolve together over time to deal with evolving threats and challenges.

And underlying the model and the code is a multinational team. And this team is the core capability, which can drive weapons development over time. MBDA has functioned as the prime and has worked with three aircraft manufacturers and radar manufacturers already and is working with additional players as the missile prepares to go onto the F-35.

What has been a challenge – working with six air forces – is an opportunity as well. Each of the partners had different takes on the target set they wished the missile to serve. This has meant that the range of targets and engagement envelopes were very wide ranging, from low-level cruise missiles and high flyers, to UAVs, to helos, etc. The end result is a software upgradeable missile with a very wide-ranging initial capability to deal with a diversity of targets.

Another key aspect of the missile is it is designed from the beginning to be employed on and off-board. It can be fired by one aircraft against a target initially cued by another aircraft or system and then handed over for delivery to target by the original aircraft or the inflight data link can be used via another asset – air or ground based – to guide it to target.

It is understood the missile will be integrated into the Block 4 of F-35. When so done, the missile can provide a sweet spot of 4th and 5th generation weapons integration with its core networking capability. Because of the nature of software integration on the F-35, the Meteor missile, which will be integrated onto the F-35 due to European requirements, means that it is available to all the other global partners of the F-35 as well.

The RAF Typhoon Force is leveraging Meteor as a key asset to work integration with the F-35.

The Typhoon is being modified to enhance its capability to receive targeting data from F-35s and with the longer range of the Meteor can operate as a weapons caddy for the F-35 in firing many types of weapons, and certainly provide a significant barrage of air to air strike missiles to support the forward operations of the F-35.

http://www.sldinfo.com/building-a-21st-century-weapon-the-case-of-the-meteor-missile/

Training is already underway for this transition and interviews with RAF pilots recently involved in Red Flag and Green Flag exercises in the United States highlighted the evolving RAF thinking.

Shaping a new weapons revolution where weapons are enabled throughout the attack and defense enterprise and not simply resident for organic platform operations is a key element of the way ahead. For example, the new software enabled Meteor missile can be fired by one aircraft and delivered to target by that aircraft or the inflight data link can be used via another asset – air or ground based – to guide it to target. METEOR firing from Gripen. Credit: SAAB

With regard to Red Flag 17-1, Wing Commander Billy Cooper, the 6th Squadron Typhoon commander had this to say about the way ahead:

"If you optimize the relationship between fourth and fifth-gen would want your 4th gen as far from harm as possible, especially given the low observable nature of the 5th gen platforms.

"In the air to air war you would therefore want to have the longest-range weapons you could on your 4th gen platforms.

"That is where Typhoon and Meteor comes in; I really do think it will be a game-changer in the 4th/5th Gen war."

http://www.sldinfo.com/red-flag-2017-1-the-perspective-of-the-6-squadron-officer-commanding/

And the Squadron Leader for II(AC) squadron based on his recent experience at Green Flag argued that a robust weaponization approach was necessary to leverage the capabilities being shaped by the 5th generation enabled air combat force.

"Weaponization of the Typhoon has been fairly well defined over the last ten years.

"Everyone's known what the integration periods are going to be for which weapons.

"One thing that we just have to keep re-assessing as that process goes on is that are these actually the right weapons for the task that the jet is going to be asked to deliver?

Second Line of Defense

"Should we add weapons for SEAD missions for example, as the F-35 becomes the forward deployed task master for such missions, aided significantly by strike assets from Typhoon?

"We need to ensure that we are not hamstringing ourselves with the weaponization process.

"We need to open the aperture as we reshape the air combat fast jet force."

And as this process evolves the integration to other non-air assets becomes crucial as well, whether it is integration with naval assets from a strike or ISR/C2 point of view.

"We've built new Type 45 destroyers and are building new CVF Aircraft carriers and Type 26 Destroyers.

"The information soak from F-35 has to be taken into account as those new assets come into service.

"Are we utilizing that information in its best available capacity?

"It is way beyond ownership of one or the other service; it is about having an integrated combat force."

http://www.sldinfo.com/visiting-iiac-squadron-at-raf-lossiemouth-the-perspective-of-squadron-leader-martin-pert/

Maximizing effective use of U.S. and allied weapons investments is crucial to accelerate the transition from the land wars to enhanced air combat power for higher intensity and higher tempo operations.

And clearly Brimstone and Spear 3 are very relevant to current and evolving US needs. It is difficult to understand why the US would not adopt this weapon and include it in its own combat capability arsenal as a complement to its other weapons such as SDB 2.

During a recent visit to RAF Lossiemouth, this is what a weapons officer had to say about the RAF experience with Brimstone.

"We first put the weapon into use a decade ago and it has become a weapon of choice for the RAF and for our allies in tasking the RAF as well.

"It enhanced the capability of the Tornado and what it could do in areas like Afghanistan.

"It became a more precise weapon and you could target individual houses, cars, moving targets, or even people with the weapon."

http://www.sldinfo.com/weapons-in-the-tornado-typhoon-transition-shaping-a-way-ahead/

Not only is Brimstone available now for the US air combat fleet, and it can be suggested as well, that it is not simply fast jets which could use this capability but other airborne platforms as well (it is believed that the UK plans to integrate Brimstone on Protector and its AH-64 too) but the Spear 3 follow on weapon will be integrated onto F-35 and available for the US forces almost as an app.

According to MBDA in an article published in Air Power 2017:

The need for greater range and capability in the air-to-ground mission has been recognised for a number of years. Most direct fire weapons have relatively short range and the array of glide bomb weapons are not providing adequate time to target, time on target and end-game performance capabilities – let alone the range – needed to defeat existing and emerging Ground Based Air Defence systems.

For this reason there is significant focus on developing systems that can defeat the increasing threats.

MBDA's SPEAR air-to-ground precision strike weapon will meet this growing operational demand. Utilising and building on the best key technologies from the combat proven Brimstone weapon, SPEAR is being developed to meet the requirements for a multi-load out missile system for operation from fixed wing aircraft. Initially the weapon will be deployed on the UK's Royal Air Force and Royal Navy F-35 fleet.

Artist Rendition of F-35 Firing Spear 3 Missile. CreditL MBDA

For F-35, the weapon will be mounted on a launcher that will enable four munitions to be carried in each bay alongside another weapon such as Meteor. SPEAR is equipped with a multi-spectral seeker, linked with a multiple-effects warhead.

Where SPEAR differs from glide weapons is that MBDA has equipped SPEAR with a small turbojet motor, along with its sophisticated guidance system, wing kit and actuators. The turbojet is a key benefit, providing the warfighter with significant advantages when deploying the weapon.

The weaknesses of glide weapons are that they tend to be operated in near line of sight and any deviation / off bore sight launch reduces their range. Additionally, as glide bombs are unpowered, any adverse wind or weather conditions also dramatically reduce their range. Their lower speed, agility and range rapidly reduces the realistic engagement options for the pilot.

Time critical targets also become a challenge for glide weapons – they are simply too slow to meet the needs of the modern battlefield. SPEAR's range capability in any weather conditions is unmatched, as is its seeker accuracy and performance against moving targets.

SPEAR has already concluded extensive and successful subsystems and airframe proving demonstrations for the UK MoD customer.

For example in the Spring of 2016, a SPEAR missile was launched from a Eurofighter Typhoon aircraft deployed from the BAE Systems facility at Warton, UK. The aircraft was flown to the QinetiQ range at Aberporth where

SPEAR was successfully deployed. SPEAR is carried upside down so at launch the missile must turn over, then deploy its wings, start the jet engine and then navigate a course to target. All these operations were successfully demonstrated during the trial.

http://ow.ly/Xae730dzsbz

Spear 3 is a natural for the USMC concepts of operations and its closest partner, the UK, will have already done its integration. The new business model would suggest that the USMC and USN should seriously consider acquiring this weapon for the relevant mission sets.

Recently, Defence Minister Fallon suggested that the UK's openness to acquiring US weapon systems needs to be reciprocated by the United States. But the new F-35 business model goes beyond the simple question of classic protectionism or conducting costly but meaningless competition when an off the shelf allied solution is already in play.

Put bluntly, the F-35 business model rests on leveraging joint investments and capabilities. For the United States not to follow the F-35 business model would suggest that the business rules followed by DoD simply are not capable of adjusting to the new 21st century realities of business.

And the Trump Administration can not really want to see such lack of innovation, an innovation generated by the new combat capability which the US has invested so much in itself.

And the UK investments and operational efforts to integrate UK weapons onto the RAF/RN F-35s is clear and significant. The UK will integrate Paveway 4, Meteor, SPEAR 3 and ASRAAM to the 'B' variant aircraft and be operational with these weapons by c. 2023. It simply remains for the US to pursue the logic of the F-35 business model.

RESHAPING THE MARITIME DOMAIN AWARENESS STRIKE ENTERPRISE

Either through flying the P-8 or P-8 Triton combination or contributed significant upgrades to legacy equipment and building the kinds of sensors crucial to maritime domain dominance, allies are contributing from the ground up to the evolution of US new platforms or providing technology which could be adopted by US forces as well, or certainly contributing to the data stream necessary to dominate the maritime battlespace.

Standing Up the P-8/Triton Maritime Domain Strike Enterprise in Australia: Visiting RAAF Edinbourgh

2017-04-24 By Robbin Laird

During a visit to Australia last Spring, I had a chance to visit South Australia and RAAF Edinburgh, which is near Adelaide.

At Adelaide, the Australian Navy will be building its new submarines and at RAAF Edinburgh the Aussies are standing up the other key element of their 21st century ASW capabilities, namely, the core P-8/Triton base.

I visited RAF Lossiemouth where the Brits are standing up their P-8 base and both the Aussies and the Brits are building 21st century infrastructure to support their new fleets of aircraft.

And certainly there will be cross learning between the two air forces as both face similar and large operating areas working with the USN and other ASW partners.

Australia is a cooperative partner in the P-8, somewhat similar to an F-35 partnership so are developing capabilities from the ground up with the USN.

And because they are a cooperative partner, FMS buyers will pay a fee to both the USN and the RAAF.

At Lossiemouth I discussed the new infrastructure with key RAF officials responsible for the effort, and that interview will be published later but the key role of standing up new infrastructure to support this effort is crucial to handle the new data rich airplanes, as well as the work with allies in operating the assets.

Having visited Norway earlier this year and having discussed among other things, the coming of the P-8 and the F-35 in Norway, it is clear that what happens on the other side of the North Sea (i.e., the UK) is of keen interest to Norway.

And talking with the RAF and Royal Navy, the changes in Norway are also part of broader UK considerations when it comes to the reshaping of NATO defense capabilities in a dynamic region.

The changes on the UK side of the North Sea are experiencing the standup of a P-8 base at Lossie, which will integrate with US P-8 operations from Iceland and with those of Norway as well.

In effect, a Maritime Domain Awareness highway or belt is being constructed from the UK through to Norway.

A key challenge will be establishing ways to share data and enable rapid decision-making in a region where the Russians are modernizing forces and expanded reach into the Arctic.

What was clear from discussions at Lossie is that the infrastructure is being built from the ground up with broader considerations in mind, which I am calling, building a 21st century MDA highway.

To the South, at Marham and Lakenheath, the UK and the US are shaping would clearly be an integrated operational capability reaching to Norway, Denmark and the Netherlands.

Flying the same ISR/C2/strike aircraft, the challenge will be similar to what will be seen in crafting the MDA highway as well – how best to share combat data in a fluid situation demanding timely and effective decision-making?

The UK is clearly a key player in shaping the way ahead on both, investing in platforms, infrastructure and training a new generation of operators and maintainers as well.

In this sense, the UK-US-Norwegian-Danish-Dutch interoperability will be a foundation for shaping 21st century security in the region.

It is as much about the US learning with the allies as the allies learning from the United States.

And at the heart of this learning process are the solid working relationships among the professional military in working towards innovative concepts of operations.

This is a work in progress that requires infrastructure, platforms, training and openness in shaping evolving working relationships.

The RAF is building capacity in its P-8 hangers for visiting aircraft such as the RAAF, the USN, or the Norwegian Air Force to train and operate from Lossiemouth.

The Australians are building a very interesting structure to support their P-8s and Tritons.

Second Line of Defense

At the heart of the enterprise is a large facility where Triton and P-8 operators have separate spaces but they are joined by a unified operations centre.

It is a walk through area, which means that cross learning between the two platforms will be highlighted.

This is especially important as the two platforms are software upgradeable and the Aussies might well wish to modify the mission systems of both platforms to meet evolving Australian requirements.

I had a chance to discuss the standup of the facility with Wing Commander Mick Durant, Officer Temporary Commanding 92 Wing, Wing Commander David Titheridge, Commanding Officer 11 Squadron and Wing Commander Gary Lewis, , Deputy Director P-8 and Triton Transition.

Question: Obviously, you are working with the USN in standing up these two platforms. Could you describe that working relationship?

Answer: We've got an incredibly tight connection with the USN at the moment.

In fact, they're doing all of our initial transition training.

So they're taking our current P-3 aviators and converting them to P-8 in Jacksonville through the VP-30 training system.

There's an enduring connection, which everybody's going to benefit from in the long run.

We are P-3 operators and you need to realize that we developed indigenously a significant set of upgrades on our AP-3Cs that are not on the US P-3Cs.

In fact, some of these upgrades provided functionality in sensors that are similar to what we have so far on the P-8.

The Royal Australian Air Force's first P-8A Poseidon, A47-001 fly's in formation with a current AP-3C Orion over their home Base of RAAF Base Edinburgh in South Australia. In an Australian first, a Neptune, Catalina, AP-3C Orion and P-8A Poseidon aircraft have flown over Adelaide together to mark the start of a new era for the Royal Australian Air Force. Representing four generations of aircraft flown by Number 11 Squadron, the aircraft have flown over Adelaide to celebrate the arrival of the first Royal Australian Air Force P-8A Poseidon to RAAF Base Edinburgh. During the Air Force's transition to the P-8A Poseidon, the AP-3C Orion will

continue to operate from RAAF Base Edinburgh, providing maritime surveillance operations across the globe. By 2022, twelve aircraft will be based at RAAF Base Edinburgh, with an additional three to be acquired as part of the Government's 2016 Defence White Paper commitment.

But the operating concept of the two airplanes is very different and we are working the transition from the P-3 to the P-8 which is a networked asset both benefiting from other networks and contributing to them as well as a core operational capability and approach.

The changes that are coming are very exciting.

So we're moving from an aircraft, which we've pretty much maximized, to a new one which is called P-8, for a reason.

This is an A model aircraft. So with an A model aircraft comes to the ability to grow.

And we're going to a new world with a starting point, which allows us to grow.

The capacity to integrate, innovate, and talk to our allies and our own services is a quantum leap in what we've had in the past and it will allow us to be able to do our roles differently.

Shaping that change is one of the key missions that we've got.

We are going to innovate and think out of the box compared to P-3 tactics and concepts of operations.

Question: You fly the Wedgetail and the P-8.

Even though the systems are different, there must be some cross learning opportunities?

Answer: There are.

We can start with the 737 aspects of operating both aircraft and the maintenance opportunities and challenges.

And we do train the electronic system operators on the Wedgetail.

And as we stand up we can connect the simulators as well to shape a broader approach to the capabilities the three aircraft can deliver, namely Wedgetail, P-8 and Triton.

There are many opportunities regarding the synergies between the E-7A and the P-8A that we are yet to explore.

Question: With an aircraft with a broader span of capability, there is the challenge of the demand side.

What about the challenge of meeting the needs of a broader set of customers?

Question: The MPA is a very flexible platform and has been in high demand by many customers.

That is both an opportunity and a challenge.

Answer: What it means it that is we will have to prioritize the missions and the customer base for the new systems and capabilities.

We have a large, expansive ocean that we need to patrol around Australia, a large region of interest and we have a small number of assets.

Second Line of Defense

Tasking prioritization, discipline associated with that and getting that right so that we can maximize all those opportunities is key.

With the P-8, and family of systems with the Triton, we can deliver capabilities to many more customers at varying levels, ranging from the strategic to the operational tactical level.

Balancing that demand and getting it right is going to be challenging.

It's a bonus, it's a fantastic opportunity, but at the same time we can't do everything for everyone all the time.

That said, we have directed levels of capability that we will be able to meet.

Question: Let us talk about the way ahead and the advantages of being on the ground floor of the P-8 program.

How do you see those advantages?

Answer: In some ways, it is like having a two nation F-35 program.

Because we are a cooperative partner we have a stake and say in the evolution of the aircraft.

And this is particularly important because the aircraft is software upgradeable.

This allows us working with the USN to drive the innovation of the aircraft and its systems going forward.

We've been allowed to grow and develop our requirements collectively.

We think this is very far sighted by the USN as well.

I think we've got the ability to influence the USN, and the USN have had the ability to influence us in many of the ways that we do things.

We will be doing things differently going forward.

It is an interactive learning process that we are setting up and it is foundational in character.

Let's look at what we're actually generating at the moment.

We're generating generation's worth of relationship building, and networking between the communities.

We are doing that over an extended period of time.

For about three years we have been embedding people within the USN's organization.

There's friendships that are being forged, and those relationships are going to take that growth path for collaboration forward for generations to come.

When you can ring up the bloke that you did such and such with, have a conversation, and take the effort forward because of that connection.

That is a not well recognized but significant benefit through the collaborative program that we're working at the moment.

We are shaping integration from the ground up.

And we are doing so with the Australian Defence Force overall.

A number of exercises and training opportunities are designed to have all the three services integrated and working in the same complex battle space.

We're reworking the way we do business internally, let alone as a collective, or collaborative process.

It's a great opportunity with the new capabilities we've got to actually empower our forces for integration at all levels.

Question: With the focus for the past decade upon land wars, ASW skill sets have clearly atrophied for the key allied navies.

How have you dealt with this?

Answer: It is a challenge.

We've had to work hard to make sure that our skills did not atrophy to the point where we didn't have that capability.

And we've done that.

And we've done it on the AP-3C in time to move to the P-8 and take on all these new ways of doing business.

So I think we arrested that just in time, but it was a real risk that we faced as well.

Some can look at the new P-8/Triton dyad as delivering significant ISR and C2 capabilities into the battlespace and it will.

But we cannot forget our core mission – which is ASW or as you have described it Maritime Domain Awareness strike capabilities.

We're the only capability that does independent long range maritime strike.

That's the thing we need to work hard to maintain.

We need to make sure that we meet our preparedness requirements to provide long range ASW, and ASUW and those missions are key to the way we train, and do business.

Shaping a 21st Century Base: RAF Lossiemouth and the Coming of the P-8

2017-07-12 By Robbin Laird

During my visit to RAF Lossiemouth in March 2017, I had a chance to talk with the senior officers involved in rebuilding the infrastructure at the base for the arrival of an additional Typhoon squadron and for the coming of the P-8.

Having visited Norway earlier this year and having discussed among other things, the coming of the P-8 and the F-35 in Norway, it is clear that what happens on the other side of the North Sea (i.e., the UK) is of keen interest to Norway. And talking with the RAF and Royal Navy, the changes in Norway are also part of broader UK considerations when it comes to the reshaping of NATO defense capabilities in a dynamic region.

Second Line of Defense

In effect, the changes on the UK side of the North Sea are experiencing the standup of a P-8 base at Lossie, which will integrate with US P-8 operations from Iceland and with those of Norway as well.

In effect, a Maritime Domain Awareness highway or belt is being constructed from the UK through to Norway.

A key challenge will be establishing ways to share data and enable rapid decision-making in a region where the Russians are modernizing forces and expanded reach into the Arctic.

What was clear from discussions at Lossie is that the infrastructure is being built from the ground up with broader considerations in mind, which I am calling, building a 21st century MDA highway.

To the South, at Marham and Lakenheath, the UK and the US are shaping would clearly be an integrated operational capability reaching to Norway, Denmark and the Netherlands.

Flying the same ISR/C2/strike aircraft, the challenge will be similar to what will be seen in crafting the MDA highway as well – how best to share combat data in a fluid situation demanding timely and effective decision-making?

The UK is clearly a key player in shaping the way ahead on both, investing in platforms, infrastructure and training a new generation of operators and maintainers as well.

But the big rebuilding project involves P-8s and shaping the main operating base for the aircraft at Lossie.

During the discussion, Squadron Leader McDonald went to the walls of her office and began pointing at her various and diverse base maps to explain how the base was being reconfigured.

The big change on the way is building a new P-8 facility outside of the existing operating base.

This was challenge in part because of the need to dig deep and to secure the hangers and other facilities.

Lossie is facing the North Sea, so getting to bedrock is not easy.

The location though of the base is excellent from an operational point of view as Wing Commander Allen explained: “The transit time to the area of interest is much better from Lossie as opposed to say Waddington.

“We are talking approximately 1 and ½ hour’s savings of time to the areas of interest.

“That is significant in terms of giving us an operational advantage.”

The first challenge is constructing new facilities for the new Typhoon squadron.

“We compared the option of simply refurbishing old Tornado facilitates or building new ones.

“It makes more sense to build new ones given the age and condition of the legacy buildings.

“So we are building the new site on the location of a Tornado engineering facility.

“The new building will provide better support to Typhoon.”

The second challenge is building the P-8 facility with its very large hangers and support facilities.

The RAF is getting two hangars for the P-8 and Boeing is building one for servicing UK and other P-8 aircraft in the region.

According to Wing Commander Allen, "the hangars will be very large and be able to hold three P-8s at a time.

"The size of the hangar is 265 meters by 100 meters and will stand four stories up.

"The hangers will house the support capabilities, such as the training center.

"Behind the main operating hangars will be the engineering support facility."

Operation Joint Warrior. Credit:RAF, 4/30/12

Boeing is investing in the base as well.

According to a 2016 BBC story: "Boeing has confirmed it will invest about £100m in an operational support and training base at RAF Lossiemouth, creating more than 100 new jobs.

The move is part of a deal struck between Boeing and the UK government."

http://www.bbc.com/news/uk-scotland-scotland-business-36763883

In addition to housing for the UK needs, the US Navy will operate there as well and the Norwegians will train at the base.

And according to Wing Commander Allen, they are looking to other P-8s users to come to the base as well, notably the Australians.

Allen commented with regard to the Norwegians:

"We have talked about sharing of facilities with Norway because they were getting P-8 and we're looking at the same piece of water.

"Its just a question of working out how we can share facilities in an effective manner going forward."

When one flies into Aberdeen, it is hard to miss the significant Norwegian presence in the North Sea oil business.

In effect, the commercial side of the house has preceded what one might well see on the military side.

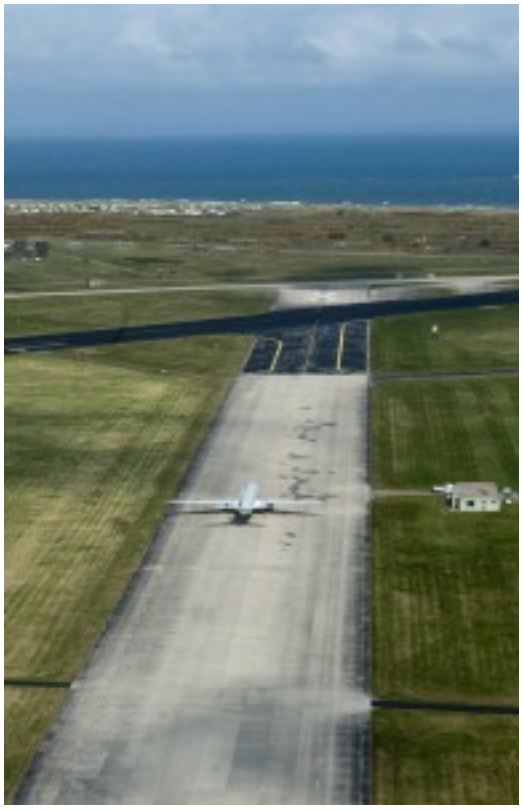
The twin transformation – a major one for P-8 and an upgrade for Typhoon – means that other facilities will be modernized as well.

Second Line of Defense

In addition to runway servicing, a new control tower will be built on a new location on the base. The location selected provides a better view of the overall operating base emerging at Lossie compared the legacy air tower.

Collocated with the new air control tower will be a new fire station to handle emergencies.

As Squadron Leader Macdonald noted: "We also need an upgraded fire station too because the Crash CAT will rise up to Crash CAT seven for P-8 – because of the crew numbers on the aircraft."



Operation Joint Warrior, Credit: RAF, 4/30/12

And Wing Commander Allen highlighted a core 21st century aspect of infrastructure:

"The challenge is how will we handle the huge amount of data being generated by our P-8 force let alone by the other P-8s operating in the area?

"How to identify rapidly what is most relevant to whom in the operational space?"

And that leads as well to another infrastructure challenge – power supplies and information and communication cabling.

This is not the most visible or sexy part of an infrastructure discussion but it is central to a 21st century base, notably as information rich aircraft are added to the fleet.

The challenge will be to deal with the old and the new when sorting through a cabling and power architecture that can support a 21st century fleet.

When I visited Marham, much of the base had been ripped up precisely to deal with the twin challenges of power supply and information infrastructure.

And as at Marham, there is significant time pressure.

The delivery of the aircraft is one timeline; the preparation of the base to support P-8s is another.

And obviously you want the time deltas to converge effectively.

This is a challenge which I am sure will keep these two officers more than busy.

The Norwegian Navy and Shaping Air-Sea Integration for Norwegian Defense

2017-02-18 By Robbin Laird

After the Norwegian Airpower Conference, 2017, I had a chance to talk with the head of the Norwegian Navy, Rear Admiral Lars Saunes.

Because this was an airpower conference, the focus on the maritime dimension naturally was primarily focused on air-sea integration in the extended defense of Norway.

The Chiefs of Navy, the Joint Forces, the Air Force and Army, respectively at the Norwegian Airpower Conference, February 2017.

A key theme within the Conference was the re-emergence of Russia as an air and maritime power globally, and most certainly in the Northern region.

The Northern Fleet and the defense bastion built around the Kola Peninsula are two aspects of the direct presence of the Russians in the Norwegian area of interest.

And clearly, the expanded reach of Russia into the Arctic also affects the nature of the air and sea domain of strategic interest to Norway as well.

In the Long Term Plan issued on June 17, 2016, this is how the Ministry of Defence characterized the Russian challenge.

The most significant change in the Norwegian security environment is Russia's growing military capability and its use of force. The military reform in Russia has resulted in a modernization of Russia's conventional forces as well as a strengthening of its nuclear capabilities.

Second Line of Defense

The Russian annexation of Crimea in 2014 and the continued destabilization of Eastern Ukraine both constitute violations of international law, which have had a dramatic effect on European security. Russia has repeatedly proven itself willing to use a wide range of measures, including military force, to sustain its political dominance and influence.

Even though Russia does not constitute a military threat to Norway, the combination of military modernization and the will to exert as a central factor in Norwegian defense planning.

Areas in Norway's immediate vicinity are also central to Russian nuclear deterrence, and Russia's military presence and activities in the North have increased in recent years.

The High North continues to be characterized by stability and cooperation, and Russian strategies for the Arctic still emphasize international cooperation. At the same time, we cannot rule out the possibility that Russia in a given situation will consider the use of military force to be a relevant tool, also in the High North

https://www.regjeringen.no/globalassets/departementene/fd/dokumenter/rapporter-og-regelverk/capable-and-sustainable-ltp-english-brochure.pdf

The Russian and Norwegian areas of strategic interest are clearly congruent with one another, which means that engaging and deterring Russia in the air and sea space of Norway and into the North Atlantic and the Arctic is central to Norwegian defense

And this means as well that Norway needs a solid relationship with allies to ensure that both the extended defense of Norway as well the defense of NATO's Northern Flank are secured.

With the modernization of Russian forces, the addition of new surface and subsurface assets and enhanced precision strike capabilities, Norway and, indeed NATO, faces a formidable challenge, on both the conventional and nuclear level.

A key requirement is to have very accurate real time knowledge of the operation of Russian forces and sufficient capability to deal with those forces in times of crisis.

The Norwegians already have Aegis combat systems aboard their frigates which provides an opportunity to build out the fleet and to integrate them with the new air combat power coming to Norway and to NATO in the region.

Both the F-35s with their ability to have significant reach through the MADL linkages among the fleet and the ability to process data in real time, as well as the P-8 maritime domain awareness strike platform which can be cross linked among Norwegian, American and British platforms provides an important element of shaping a way ahead for the kind air-sea integration Norway needs to deal with evolving challenges.

http://www.sldinfo.com/the-arrival-of-a-maritime-domain-awareness-strike-capability-the-impact-of-the-p-8triton-dyad/

During the Conference, one analyst focused on the bastion defense approach being taken by the Russians from the Kola Peninsula out and the challenges this posed for Norway.

The broad point is that not only are the Russians modernizing their forces they are working and extended reach for those forces from their own territories.

The Russian Bastion Defense Concept being discussed during the Norwegian Airpower Conference, February 2017

This was point made as well in an interview we did with the recently tired head of NORAD/NORTHCOM who highlighted the enhanced threat from the 10 and 2 Oclock from the United States and, of course, Norway lies in the 2:00 region as seen from North America.

http://www.sldinfo.com/north-american-defense-and-the-evolving-strategic-environment-admiral-gortney-focuses-on-the-need-to-defend-north-america-at-the-ten-and-two-oclock-positions/

This is a notional rendering of the 10 and 2 O'Clock challenge. It is credited to Second Line of Defense and not in any way an official rendering by any agency of the US government. It is meant for illustration purposes only.

The head of the Norwegian Navy highlighted the importance of the new air platforms, and the new submarines and the need to effectively integrate the data provided by those platforms as well as crafting and evolving the C2 necessary to leverage an integrated air-sea force.

He also highlighted the fact that the sensors and weapons onboard his surface ships can interact with the air assets to provide support and protection as well for the air systems.

Second Line of Defense

I asked him about the opportunity notably to integrate Aegis with F-35s, something I referred to in earlier work as the long-reach of Aegis, and he commented" that was more than happy to be the wingman for the F-35 if it helped destroy adversary targets."

http://www.usni.org/magazines/proceedings/2012-01/long-reach-aegis

But he noted that this was a work in progress for the USN and the Norwegian Navy would work closely with the US Navy on this issue.

The Rear Admiral underscored that flying the same assets as the US Navy, the USAF and the RAF and the Royal Navy would provide enhanced capabilities within the North Atlantic.

And it should be noted that the coming of the Queen Elizabeth will bring F-35s into the integration effort with P-8s, and as Royal Navy Officer pointed out in his presentation in Australia to the air-sea integration conference, that the Royal Navy was looking to integrate their surface fleet with the F-35s to provide for cross cutting fire support, similar to what the US and Norwegian navies are looking to do as well.

http://www.sldinfo.com/f-35-and-aegis-preparing-for-the-integrated-fight-in-the-extended-battlespace/

The Rear Admiral noted that the Norwegians have never stopped flying their MPAs, in this case their P-3s, over their areas of interest in the North.

They did not send their P-3s to the Middle East, nor did they retire their MPAs as did the UK.

"We have kept this competence not only alive but focused on the key areas of interest to us in the region."

http://www.sldinfo.com/keeping-skill-sets-alive-while-waiting-for-a-replacement-aircraft-from-nimrod-to-p-8/

The P-3s have been "critical to understand the underwater domain for our forces. We are buying the P-8 because of its capability and the priority to focus upon this capability.

He argued that although they are interested in the future of autonomous systems, they will work with allied navies as they introduce such capabilities and to sort out a way ahead for Norway with regard to such systems in the future.

For example, in my interview with the USCG Commandant, he highlighted that he believed that Unmanned Underwater Vehicles might of interest, namely in the Arctic region.

I am sure the Norwegian Navy will watch this closely and interact with the USCG on their operational experiences as part of their own learning curve.

http://www.sldinfo.com/the-way-ahead-for-the-uscg-the-perspective-of-admiral-paul-zukunft-commandant-of-the-uscg/

The Rear Admiral did point out that the P-8 and the F-35 are man-machine systems and as the Norwegian forces got operational experience with these systems, they would open the aperture with regard to expanding the scope of including autonomous systems as well.

Indeed, it should be noted that the USAF is working hard on fifth generation aircraft incorporating autonomous systems as part of future deployment packages (this is what Secretary Wynne has referred to as the Wolfpack operational concept).

http://www.sldinfo.com/shaping-the-wolfpack-leveraging-the-5th-generation-revolution/

The Rear Admiral closed by highlighting the challenge of shaping rapid decision making systems which can make effective use of the new systems.

In many ways his concern on this issue reminded of the comments by the Commander of the Australian Fleet:

"We are joint by necessity.

"Unlike the US Navy, we do not have our own air force or our own army. Joint is not a theological choice, it's an operational necessity."

It was clear both from his presentation and our discussion during the interview that Rear Admiral Mayer was focused on how the build out of the Navy in the period ahead would be highly correlated with the evolution of the joint network.

"The network is a weapons system.

"Lethality and survivability have to be realized through a networked effect."

http://www.sldinfo.com/the-network-as-a-weapon-system-the-perspective-of-rear-admiral-mayer-commander-australian-fleet/

Norway has announced that they are adding a P-8 acquisition to their coming F-35 force as part of their enhanced defense posture.

To provide for a maritime surveillance capability that can meet current and future challenges, the Norwegian Government has announced their intention to acquire five P-8A Poseidon maritime patrol aircraft for the Armed Forces," the Norwegian Defense Ministry said in a statement attributed to Defence Minister Ine Eriksen Soreide.

"P-8A Poseidon is a formidable platform for monitoring our oceans, and will provide both Norwegian and allied civil and military authorities with a sound basis for decisions.

With modern sensors and weapons, the new Poseidon aircraft continue and improve this capability."

The aircraft would replace Norway's six Lockheed Martin-made P-3C Orion aircraft and three DA-20 Falcons, jets made by the French company Dassault.

The contract for the Poseidon aircraft also includes sensors, surveillance systems, anti-submarine weapons and support systems, according to the release.

This joins with the UK emphasis on the return to ASW and North Sea defense efforts as well,

According to a story on the UK Ministry of Defence website, the UK and Norway have agreed on new cooperation on Maritime Patrol Aircraft.

With the coming of the P-8 to the RAF, the UK MoD is looking to ways to enhance its impact on defense in the North Sea and beyond.

Sir Michael, who visited Norway's top military headquarters, close to the Arctic Circle on Thursday, announced that the UK and Norway would work closer on Maritime Patrol Aircraft cooperation, including in reducing costs and increasing operational effectiveness.

Second Line of Defense

The UK announced that it would procure nine Boeing P8 MPA in last year's Strategic Defence and Security Review.

The new capability, which will be based in Scotland, will allow for enhanced situational awareness in key areas such as the North Atlantic, and will also further increase the protection of the UK's nuclear deterrent and our two new aircraft carriers.

Sir Michael also visited Norway's Bodø Main Air Station, home of two F-16 squadrons and a squadron of Search and Rescue Sea King helicopters, where he signed a new agreement on host nation support for UK exercises in the country, further increasing the UK and Norway's ability to exercise, train and operate together.

Mr Fallon welcomed the fact that British armed forces undertake yearly winter training in Norway, particularly 3 Commando Brigade in Harstad and Evenes and elements of Joint Helicopter Command at Bardufoss.

Defence Secretary Sir Michael Fallon said:

Britain needs Maritime Patrol Aircraft to keep watch over the seas.

As part of our £178 billion defence equipment programme, we've committed to new maritime patrol aircraft that are able to monitor threats to Britain and our armed forces.

By stepping up cooperation with Norway on maritime patrol, we will help keep Britain safer and more secure.

The Defence Secretary arrived in Norway following meetings with the Northern Group countries on Wednesday in Copenhagen, where he reaffirmed the UK's commitment to European defence.

As part of this, the Defence Secretary announced that 5 Battalion The Rifles would lead the UK's battalion in Estonia next year, part of NATO's Enhanced Forward Presence in the East.

Work on the UK's MPA programme is progressing well, including the investment on infrastructure in Lossiemouth in Scotland, where the planes will be based.

Former armed forces personnel who previously served on UK Nimrod are also re-joining the RAF to help operate the future P-8s.

12 have recently re-joined and more will re-join in the future

https://www.gov.uk/government/news/uk-and-norway-agree-new-cooperation-on-maritime-patrol-aircraft

Canada and the Maritime Domain Strike Enterprise in the North Atlantic

7/29/17

By Robbin Laird

The return of the Russian threat to Northern Europe has lead a number of key US allies to rework their defense capabilities and to emphasize new working relationships among themselves as well as with the United States. In an earlier interview the then NORAD and Northcom head, Admiral Gortney, he emphasized the growing threat to what he saw as the 10 and 2'Oclock to North America. And in this effort, he highlighted the key role, which Canada plays and needs to play.

"For 58 years, we have had a bi-national command, NORAD. The current government faces a set of tough problems, not the least of which due to past governments not addressing re-capitalization.

"Clearly, what they need to do is to recapitalize their air and maritime force, and preferably, one that can work together from the ground up as an integrated force. I think NORAD needs to become a multi-domain command, and their forces could flow into that command and out of that command as a key enabler."

http://breakingdefense.com/2016/04/northcom-defending-north-america-at-ten-and-two-oclock/

Recently, I had a chance to interview the head of the Royal Canadian Air Force, Lt. General Michael Hood, to discuss the evolving Canadian role in the 10 O'Clock, notably with regard to ASW and participation in the evolving maritime domain strike enterprise in this key area of operations.

Currently, the Canadians are flying upgraded CP-140s which are variants of C-130s along with introducing new ASW helicopters, the CH-148 Cyclones along with upgrading their frigates for ASW operations.

"We have been flying two members of the RAF crews on our ASW aircraft in the interim between the sunset of Nimrod and the sunrise of the P-8. We have also filled the gap left by the sun setting of Nimrod with our own ASW assets. We have done so by operating from either RAF Lossiemouth or Keflavik to help manage the GIUK gap. Out of all of the NATO ASW platforms in there, the most effective one has been our CP-140. I am exceptionally proud of our ASW capability and when I couple it with the new advanced capability on our upgraded frigates, I see us a backbone of NATO's ASW capability."

He argued that the current CP-140s have better sensors than currently operating onboard the P-8s.

"We have better capability from an ASW perspective in the CP-140 than comes off the line presently in the P-8. We have just gone through a Block III upgrade that has completely modernized the ASW capability as well as adding an overland ISR piece. We have replaced the wings on many major empennage points and the goal is to get our CP-140 out to about 2032 when we're going to replace it with another platform."

Lt. General Hood focused very much on the evolving maritime domain and strike enterprise emerging in the North Atlantic as a key domain to which Canada currently contributes to in significant ways.

http://breakingdefense.com/2017/07/allies-and-the-maritime-domain-strike-enterprise/

The General noted that the new defense policy has authorized adding a UAS capability for the ASW effort as well. "In the next three years, we'll be under contract for a medium altitude UAS system that is going to have both domestic and coastal abilities as well as expeditionary strike capabilities. We participate in NATO AGS as well. We've got a number of people and have funded significantly NATO AGS in a Triton-like capability."

And now that the RCAF has been given the space mission, the General discussed as well the satellite side of the equation with regard to ASW and the High North as well. The new RADARSAT constellation will provide enhanced sensor coverage and Canada plans to launch a polar constellation satellite system to provide for High North communication needs.

"That is actually going to finally allow us to see operate UASs up above 70 degrees north."

The integration of space with unmanned assets such as Triton along with the various manned Maritime Patrol Aircraft operating in the North Atlantic, upgraded French Atlantiques, Canadian Auroras and new P-8s is how the new enterprise is being crafted. And for Lt. General Hood, this evolving mix of capabilities into a more

integrated network is what Canada will leverage as Canada shape's an approach to the modernization of their assets, including a replacement air platform a decade ahead.

"What do we need to put onto the new manned platform from the standpoint of the evolution of the network. Canadian industry has played a key role in shaping capabilities onboard the CP-140 and I would see that role continuing on our replacement manned aircraft. It's less about the platform, but the brains of that platform."

We concluded by discussing the question of NORAD and the way ahead. The head of the Royal Canadian Air Force noted that "I've just had staff talks with General Dave Goldfein and General Jay Raymond from US Space Command and I can tell you that certainly on the space side, we are the critical partner of your country in sharing that burden in space and making sure that we're ready for the future."

MOVING ON BEYOND AWACS: THE ARRIVAL OF WEDGETAIL

Why Not Buy Wedgetail and Move Out Beyond AWACS: Coming To Terms with a 5th Generation Enabled Force

2017-02-15 The Aussie Wedgetail has come to Red Flag 2017-1 and has provided advanced C2 and support to a fifth generation enabled air combat force.

F-35s, F-22s and advanced legacy aircraft like Typhoons have been supported throughout by the most advanced air battle management system operating today.

And it is being operated by the RAAF and not the USAF; and the RAF is also considering its acquisition.

Instead of slow rolling an upgrade of AWACS, it is time to leap ahead and move beyond the 360 degree radar dome technology and embrace a very different concept of air battle management, one good for today and one very integratable into the tron warfare and distributed operations of the future.

In the following report by the RAAF, their recent participation in Red Flag 17-1 is highlighted.

After three weeks of high-intensity missions, Exercise Red Flag 17-1 has concluded.

A 200-strong contingent of the Royal Australian Air Force (RAAF) personnel deployed to Nellis Air Force Base in Nevada with colleagues from the United States and United Kingdom. This year, Exercise Red Flag 17-1, also witnessed the United States Air Force (USAF) debut its F-35A Lightning II in the exercise.

The training operates within the 31,000-square-kilometre Nevada Test and Training Range, which is turned into a simulation of a high-end threat battlespace.

RAAF deployed a range of capabilities during Exercise Red Flag 17-1, from a combat control team that parachuted in freezing conditions to a dry lake bed for an airfield survey; to air battlespace managers who controlled movements and datalinks for more than 70 friendly and 'enemy' aircraft.

Commander of the Australian contingent, Group Captain Stuart Bellingham, said RAAF C-130J Hercules transport and E-7A Wedgetail aircraft flew on missions in Exercise Red Flag 17-1.

"By coming here, we're preparing for high-end war fighting, so we can deploy at short-notice on operations, and have confidence that we are going to be successful," Group Captain Bellingham said.

The first Exercise Red Flag was held in November 1975, borne out of the USAF's analysis of the Vietnam War, which found an aircrew's chances of survival increased if they had flown at least ten combat missions.

Those ten missions are now conducted in a modern and simulated high-threat environment at Red Flag, with the most recent exercise seeing an increase in the capability of 'enemy' surface-to-air missiles and aggressor fighter aircraft in the training range. This provides greater training challenges for the increased number of advanced fifth generation fighter aircraft participating in the exercise, such as USAF's F-22A Raptor and F-35A Lightning II.

"It is gruelling and rigorous, but all of our personnel have a fantastic time and get great value out of the exercise," Group Captain Bellingham said.

"We'll take information and training back and feed it into our force preparation, and will translate into our current operations."

For the Australian contingent, the participation of USAF-operated F-35As – as well as the United States Navy's E/A-18G Growler electronic attack jet – provided exposure to capabilities that will soon enter RAAF service.

"We are integrated with these capabilities from start to finish, from planning missions, through to debriefing the missions," Group Captain Bellingham said.

"Australia has Air Battlespace Managers from No. 2 Squadron and No. 41 Wing who are controlling the Red Flag airspace, and getting firsthand experience how these capabilities can be employed.

"We're getting real insight into understanding the capabilities and what Australia's future is going to look like."

Group Captain Bellingham also became the first non-US participant to be Director of the Combined Air and Space Operations Centre (CAOC) at Nellis, leading 250 American, British and Australian personnel.

The CAOC is responsible for planning the Red Flag missions and ensuring they're coordinated with space and cyber-based efforts, which can be contested by an aggressing force.

"Our coalition allies have been extremely engaging and supportive of our involvement in the exercise.

"In my 30 years of the Air Force, this is one of the highlights, being at the exercise is as realistic as it gets."

https://news.defence.gov.au/media/media-releases/air-force-wraps-exercise-red-flag-17-1-nevada

An Update on the Australian Wedgetail and Its Evolution: A Discussion with Group Captain Stuart Bellingham

2017-04-07 By Robbin Laird

During my visit to Australia in April 2017, I had a chance to continue my discussions with Group Captain Stuart Bellingham, Officer Commanding Number 42 Wing, about the Wedgetail and its continuing evolution.

The Wedgetail has demonstrated in the Middle East and in high end warfare exercises that it is a very good fit for the shift to a fifth generation enabled air combat force.

Most recently, I heard from USAF and RAF personnel involved in the first Red Flag this year, how impressive they found the aircraft.

Second Line of Defense

As one senior RAF pilot put it: "I would never fly with an AWACS if had a choice. I would only fly with Wedgetail."

Obviously, Number 2 Squadron and Number 42 Wing have made an impact on air combat thinking.

In this year's Red Flag 17-1, the F-35 and F-22 flew with RAF Typhoons and USAF F-15s along with the Sentinel UK aircraft and the Aussie Wedgetail, along with other assets as well.

A United States Air Force (USAF) F-22A Raptor lifts off from the runway at Nellis Air Force Base during Exercise Red Flag 17-1. Visible in the background (from left) are a Draken International Inc L-159 Albatross; a Royal Australian Air Force (RAAF) E-7A Wedgetail, and a RAAF C-130J Hercules. Credit: RAAF

But the exercise was notable in terms of the first appearance in Red Flag 17-1 an exercise in which one combat participant noted: "In this exercise, the F-35 reshaped how we are thinking about the use of our entire air combat force.

"The question was not what the F-35 could do for the rest of us; it was what can we contribute to the F-35 led air combat force?"

The Wedgetail certainly found its place in answering that question and in providing unique quarterback functionality to the force and to support functions from an ISR and C2 role as well.

Not only did the Wedgetail show up, but the Officer Commanding 42 Wing played a key role in the exercise as well.

According to an article published in Australian Aviation on February 14, 2017:

GPCAPT Bellingham was the first non-US participant to be Director of the CAOC, leading 250 American, British and Australian personnel. This was the first time a coalition nation has performed this role in such an exercise.

"We are integrated with these capabilities from start to finish, from planning missions, through to debriefing the missions," GPCAPT Bellingham said.

"Australia has air battlespace managers from No. 2 Squadron and No. 41 Wing who are controlling the Red Flag airspace, and getting first-hand experience how these capabilities can be employed.

"We're getting real insight into understanding the capabilities and what Australia's future is going to look like."

http://australianaviation.com.au/2017/02/exercise-red-flag-2017-concludes/

Question: I think Red Flag 17-1 is a good example of how we collectively are shaping a way ahead.

In effect, we are seeing the training of a network of operators who can shape high intensity air operations under the impact of fifth generation warfighting concepts.

The technology is crucial; the platforms are important; but it is the training towards where we need to go that is crucial, rather than simply training to the past.

Is that not where your experience with Wedgetail and working with allies comes in?

Group Captain Bellingham: That is a good way to set up the discussion.

I think the strength of everything we're doing at the moment only comes from a strong cooperation with our allies. Obviously, we're a tiny force, and our relevance and real strength becomes fully apparent when we tie our capabilities with those of our allies.

At Red Flag 17-1, we saw the US, the UK and Australia blending advanced assets together to make the entire force more lethal and survivable in the high end threat environment.

Question: The F-35 plays a key role in shaping the battlespace and target identification for other air assets.

What is the Wedgetail's role in that context?

Group Captain Bellingham: As we evolve the capabilities of Wedgetail, we see key roles it can play as a quarterback in a high-end fight.

And as we upgrade the software and hardware capabilities, it is only by interacting with the other assets in that air combat environment that we can truly evolve new ways of doing things.

It's not just we've updated the software and now we've got a great radar. That's a continuous process, and every time we go to these exercises and go, "You know, that was kind of neat. How do we make that repeatable, and how do we embed that in our doctrine and TTPs?"

Our true strength comes from multiple nations working together and blending their capabilities for the fight, because it is simply very difficult for any one nation to fund and deploy all the high-end capabilities we need.

Our Wedgetail contribution can be seen in this light.

Question: Let us return to the concept of shaping a network of operators for 21st century high-end operations.

How do we best get this done?

Group Captain Bellingham: It is about deploying your new assets, and learning how to use them in an interactive context.

For us, it is starting with Wedgetail, and then moving to Growler, and then to F-35, to P-8, to Triton and so on, how do we shape an effective team to dominate in an air combat environment?

Second Line of Defense

The platforms and technology is crucial but training to where we need to go and cross learning to evolve the combat force is absolutely essential for shaping the air force we need to deploy.

We see our new Air Warfare Centre as a key opportunity to do just that. One evolving aspect is that our Air Force used to conduct Fighter Combat Instructor courses; and we would send a ground controller to the course to participate.

Now the focus is on the evolution of holistic air combat capabilities and as part of that, we have a Wedgetail team participating in the Air Warfare Instructor course.

We've got several participants involved from the Wedgetail side: an electronic systems officer, a couple of the air battle managers, we have a pilot, and they're all working as a team in the airborne early warning and control space.

During the course they will evolve AEW&C tactics which are complementary to the overall Air combat domain and they will all graduate from the course as Air Warfare Instructors.

They are working that quarterback space, to understand the needs and opportunities of that network of operators and how we can change our TTPs to make them more effective.

More broadly, we are focused on being an enabler not just for the air combat force but the joint force.

For example, we are working with the Navy and the Army with regard to supporting expeditionary blue water operations and operating in concert with the new LHD and its evolving concepts of operations in the littoral space.

The enabler function is the key Wedgetail strength in terms of supporting the joint and combined combat force more generally.

Question: Wedgetail is a software upgradeable aircraft and is undergoing modernization along existing lines but you have some expanded capabilities in mind as well?

Group Captain Bellingham: We are modernizing the aircraft to enhance current C2 capabilities but we are looking at ways to exploit its extraordinary radar (via its scalability) to expand into the non-kinetic warfare space.

And we will do that as well through the cross learning we talked about earlier.

We are working really hard at the moment in collaboration with our allies to get a team approach to accelerate our learning.

We are looking to build from the achievements we've done so far and build on that cooperatively with our allies.

We're working to get to the next level, and we're looking at the next generation of E-7, based on our operational experience and leveraging the collaborative networks we have established with allies moving into the fifth generation enabled air combat force.

Question: A final thought suggests itself.

Without the global engagement of Wedgetail in operations and exercises, the entire development process you described would not be possible.

And the Wedgetail would not be showing up if not for the presence of your KC-30A, a point that could be missed.

How important has the new tanker been to enabling Wedgetail to deploy and to shape its combat learning process?

Group Captain Bellingham: You have raised a very good point.

The two came into the force at about the same time.

Without the tanker, we don't get the endurance and the ability to stay on task.

We would not have the reach and persistence.

And our part of the world we have vast distances and lots of open water, we need the expeditionary capability that a tanker brings, and a good tanker that can offload a good amount of gas and has great reliability.

The KC-30A, what it's demonstrated on operations over the last two and a half years has again been phenomenal.

Whilst it had a few initial teething problems with the boom and other things, that tanker is going from strength to strength.

Without it, we're irrelevant, because we can't do that expeditionary work which we need to be able to do.

That's important in the Middle East, but even more important in our part of the world.

Visiting Williamtown Airbase: The Wedgetail In Evolution

2016-08-22 By Robbin Laird

I revisited Williamtown airbase in August 2016, where I earlier visited the Wedgetail Squadron and the F-18 squadrons.

And during the last visit did a site visit and looked at the infrastructure modernization approach being implemented on the base.

This time, I had a chance to talk with Group Captain Stuart Bellingham, the Officer Commanding 42 Wing.

During this visit as well I was able to talk with senior Army and Navy officers involved in the evolution of Wedgetail as well and will discuss their perspectives in forthcoming interviews.

The Wedgetail is often referred to as an Aussie AWACS, but clearly is not.

The AWACs is an AIR battle managements system with the customers being largely the fighter community.

The Wedgetail is evolving towards a ground and naval engagement capability with naval and army officers onboard and with virtual Wedgetail becoming part of the officer training for the Army and Navy this process will deepen in the years ahead.

In many ways, what is being experienced with Wedgetail is what the ADF hopes to bring to the process of overall force design and greater operational integration.

Second Line of Defense

It is also part of the new air combat systems, which are software upgradeable and capable of multi-tasking.

When I interviewed 2nd Squadron at Williamtown Airbase during my first visit to Williamtown, the squadron operating Wedgetail, the Squadron Commander underscored the challenge of understanding software upgradeability:

“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 during the visit 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.”

This process of upgrading means that the software engineers work closely with the operators in shaping the evolution of the aircraft.

This is a very different approach from legacy systems.

As Paul Kalafos, Vice President of Surveillance Systems at Northrop Grumman has put it:

“We are getting significant feedback from the RAAF on deployment and requests to automate tasks where possible to enhanced the capability of the machine part of the man-machine relationship to shape a way ahead.

"A lot of the input is through the ARCS working group, which is a collaborative study environment involving Boeing, Northrop Grumman, MIT/Lincoln Labs, Air Force Life Cycle Management Center (AFLCMC), CEA Technologies, Defence Science and Technology Organisation (DSTO), Royal Australian Air Force (RAAF), and the Common Wealth of Australia (CoA).

"Operational requirements come out of that process and shape the next increment of software development.

"The ARCS is focused on problems and their resolutions.

"These are software updates.

"We get a software refresh out about once a year.

"Six months are spent doing the study to shape the plausible change; and the next six months are spent doing the integration and then getting it out the door.

"We shed the specs in favor of resolving problems, which the operational community identified.

"They can even write recommended change requests as well which provides part of the demand side process.”

Question: When I last visited Wedgetail you had not operate it in combat. Now you have.

How has it performed?

Group Captain Bellingham: "We flew to the Middle East and almost instantly began operations. Since September last year we haven't dropped one mission due to systems on the aircraft, and we're at 99 point something percent success.

"It's able to deliver everything plus more to the coalition forces.There's a lot of potential in in the Wedgetail system.

"You've got a twin engine jet, it takes a lot less fuel to keep it over the battle space. We've got 13 crewmembers on board rather than 20 plus crewmembers on board (on an AWACS) who need food and shelter and clothing and sustainment. The footprint comes down.

"And it is very reliable. It's a relatively new jet, so our reliability is high in terms of the green aircraft systems. That may change as it gets older, but right now you turn it on and it works.

"From my perspective, I think not just the US but other nations are looking at E7 going, "You know what? That's working." Whereas where we were four or five years ago it was, "Seems like we've got a bit of work to do."

Question: It is clearly a system in progress with the capability to evolve into what the US CNO calls a key capability to operate in the electromagnetic battlespace, and to do so for the joint force.

Could you talk about the joint evolution?

Group Captain Bellingham: "Army and navy officers are part of the Wedgetail crew. . We are not just extension of what the air defense ground environment or the control reporting units do from the ground. We take our platform airborne and we do air battle space management.

"Recently, in the Army led Hamel exercise, we pushed the link piecutre down to the ground force headquarters. Their situational awareness became significant, compared to what they have had before.

"And since the Williams seminar on Air-Land integration, several senior Army officers have been to Williamtown to take onboard what we can do and potential evolution of the systems onboard the aircraft.

"We are seeing similar developments on the Navy side. A key example is working with the LHD. My opinion is that the Wedgetail will be critical to making all the bits of an amphibious task group come together. And not just that but as the P-8 joins the force, we can broaden the support to Navy as well. And the new air warfare destroyer will use its systems as well to pass the data around to everyone, and making sure everyone's connected.

"The E-7 is a critical node in working force integration and making sure we're all seeing the same thing at the same time, and not running into each other, and getting each other space. We're not on a ten second scan. We are bringing the information to the war fighter or to whoever needs it right then."

Question: During the visit, we have been in the squadron building, the hangar and in the System Program Office collocated with the squadron.

What advantages does that bring?

Group Captain Bellingham: "It facilitates a close working relationship between the combat force and the system developers.

"We can share our combat experiences with the RAAF-industry team in the SPO and to shape a concrete way ahead in terms of development.

Second Line of Defense

"The team is very proactive in working collaboratively to get to the outcome we're looking for."

Question: In the SPO facility, you have a Virtual Wedgetail, which is the currently configured Wedgetail systems but located on the ground.

How as that worked for you?

Group Captain Bellingham: "It is crucial for reaching out to the warfighting community. We have plugged into both Army and Navy officer training courses.

"We are using it to work closely with the Army and Navy getting ready for our Fall exercise with the LHD to shape a task force concept of the amphibious ships.

It provides a realistic way for Army and Navy officers to see what we contribute to their warfighting tasks.

"We need a crew in the Virtual Wedgetail to make it work because they have to have the right experience and background to provide that level of reality to the force which then the warfighters can experience what we can bring right now to the fight.

"We are also working with 7th Fleet. We work with the PACAF as well. We sent two planes to Pitch Black 2016 and are participating as well in the current Red Flag Alaska. This allows for Australia and the United States to shape synergies in the force.

"We put three layers of officers into the AOC that was running the Pacific Thunder exercise to ensure the success from our perspective and get people to understand it.

"We've definitely been invited back so we'll be there again beginning of next year doing it again which will be great."

Question: The software upgradeability aspect of the plane means that you have to inform the broader warfighting community of what the evolving aircraft is now capable of. We saw those concerns when we visited Jax Navy and talked with the P-8 and Trion squadrons.

How are dealing with this challenge?

Group Captain Bellingham: "Until we stop flying the E7, it will keep getting better. The challenge is as you fairly eloquently stated it is making sure people understand the capability as we're progressing.

"It's not just one community, the fighter force, with whom we need to communicate.

"We need to work with and communicate effectively with the joint force.

"Which affects our training as we move ahead as well.

"We must make sure that our communication is effective within the joint force."

Question: Where is the future evolution of the system likely to go?

Group Captain Bellingham: "One aspect is the people aspect, namely that Army and Navy officers are not simply replicating what they have done in legacy systems. Once they become that mission commander they are that all-seeing, all-knowing, joint integrator who is a vastly different person to what they were in the ground system and they know an awful lot about joint integration and how to make that work.

"Another aspect is the evolving technology of the systems, which are clearly moving down the path of providing significant electronic-magnetic warfare capabilities as well.

"We are not just a classic flying radar.

"When we're looking forward ten years from now, that's where we're looking."

Question: The P-8/Triton dyad is coming to the force.

How will that affect Wedgetail?

Group Captain Bellingham: "Significantly.

"One aspect is that we will be operating a larger 737 fleet with six Wedgetails and 15 P-8s. We can't afford not to look for opportunities in this space."

REPLACING THE KC-10 WITH THE KC-30A

The KC-10 has been relied on increasingly as the KC-135 fleet has aged and readiness rates have decreased.

And discussions with the USAF tanking community have made it evident that the KC-10 is not only larger but can do more than a KC-135.

Why not adopt the global tanker of choice, the A330MRTT, and provide a complement to the new Boeing tanker replacing KC-135 which by the way is STILL not operational.

This might be tolerable for slow mo war; but not for the certainty of high tempo and high intensity combat operations.

Building Tanker 2.0: The Aussie Perspective

2017-04-11 By Robbin Laird

During a visit to Australia last Spring, I had a chance to discuss the way ahead for the KC-30A with the two senior operators involved with the program and its evolving capability.

We met at Amberley Airbase where the KC-30As and C-17s are based. Air Commodore Richard Lennon is the head of the Air Mobility Group and with Group Captain Adam Williams, the officer commanding 86th Wing as well as the CO of the 33rd Squadron (KC-30A).

Last year, I published an interview with the head of the tanker program at Airbus.

And in that piece underscored that having digested the operational fundamentals with the tanker, the tanker program was now moving on to the next phase, which I have called Tanker 2.0.

The baseline tanker is fully functional; now what other capabilities can be added to it as it moves beyond being a gas station in the sky?

Also, since I was last here, the Ministry of Defence has signed a new partnership to shape the way ahead for Tanker 2.0.

This agreement was announced at this year's Avalon Airshow.

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In an article published on March 18, 2017, the new partnership agreement was highlighted.

The Aussies have also signed an agreement with Airbus Defence and Space to partner in shaping what one might call Tanker 2.0, or the smart tanker.

The tanker is a mature military product operated globally and now Australia is laying the foundation for the next transition, to shape new innovations through automation and linkages to shape the smart tanker.

According to a press release by Airbus Defence and Space:

Melbourne, 2 March 2016: The Royal Australian Air Force (RAAF) and Airbus today signed a research agreement to further develop the RAAF KC-30A's capabilities.

The agreement strengthens the industrial partnership between Airbus and Australia's defence force, and will help to define the evolution of the KC-30A fleet as it reaches operational maturity and expand its capabilities.

This will result in the KC-30A's core transport and refuelling capabilities supporting the RAAF's transformation into a fully integrated force, capable of tackling complex contemporary defence and security challenges.

The agreement's first milestone is the joint development of the automatic air-to-air refuelling (A3R) concept, which represents a major step forward in in-flight refuelling.

Automating boom refuelling contacts reduces potential risk by minimising operator workload, and increases operational efficiency by cutting the time for each contact. The system requires no additional equipment in the receiver aircraft.

Initial approach and tracking of the receiver is performed manually from the A330 MRTT's console. Once the image processing system acquires the receiver and the receptacle position, the operator can use the system aid allowing the boom to automatically follow the receptacle. Final extension of the boom's telescopic beam is manually performed by its operator to make and maintain contact.

Fernando Alonso, Head of Military Aircraft at Airbus Defence and Space said: "The KC-30A offers tremendous combat potential at the heart of the integrated Air Force of the Future, including using the platform as a Communication Node, to maximise air power delivery."

Air Marshal Leo Davies, Chief of Air Force, RAAF, highlighted the value of ongoing defence and industry collaboration.

"We are delighted to contribute to the research and development of A3R with Airbus to automate the process for boom refuelling without the need for control by our on-board air refuelling operator", said Air Marshal Davies.

The Royal Australian Air Force and Airbus have successfully performed proximity trials, with physical contacts planned for the near future.

The interview started with Group Captain Williams providing an update since our last meeting at Amberley in August 2016.

"We have been performing very well with our KC-30As globally.

"In the Middle East, using only one tanker on rotation, we just passed our 75th million pound level in delivery of fuel to the combat force in that operational area.

"What does it mean?

"It means that we've got some significant experience with this airplane now."

He added that the clearance process has continued with the F-16s have been added to the planes which KC-30A has been cleared to support.

"When US F-16s were in the theater we tanked them. We have a thriving boom business in the area."

He added that the experience with the F-16s is a good way to get ready for their support to F-35s.

"They are tanking Japanese based USAF F-16s as well and are getting ready to do so for the Singapore Air Force as well."

As the KC-30A goes through a steady stream of certifications, the USAF personnel involved in certification at Edwards have now gotten used to how best to certify the software boom system used by the KC-30A.

This meant that the recent B-1 certification program happened quite rapidly as the familiarity with the KC-30A has increased within the USAF.

KC-30A and B-1 during certification testing at Edwards AFB. Credit Photo: USAF

"We conducted a short certification campaign of 12 flights to get the job done."

The Aussies are participating in the Coalition Air Refueling Initiative (CARI) as well.

This is a USAF-run program of standardization of tanker operations.

And because the KC-30A is part of a global fleet of Airbus 330MRTT tankers, Aussie certifications are also certifications for other nation's 330MRTT tankers as well.

This standardization process for tanking is crucial to shape a global coalition capability to support allied tankers worldwide, notably as the combat air force is designed to move to needs rather than to simply be based always at the point of need.

Working with the KC-30A was a first for the USAF for they had not worked with a software driven boom before.

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“They went through a lot of test points and a lot of analysis to understand both how the KC-30 worked and how the software boom interacted with the receiver behind it.”

Because the USAF is now familiar with the KC-30A and the workings of its software-driven boom, the certification process for other aircraft can be shortened considerably.

Air Commodore Lennon added: “The test community has done a fantastic job at really narrowing down the requirements for a software driven boom, and when we make software changes to the boom we don't want to be retesting every single aircraft again.

"We want to be able to assess those changes against the baseline that we already have and get on with it.”

The software enabled boom poses challenges as well to managing the way ahead for coalition air forces, given the need for managing the intellectual property of the builders of the two aircraft which will have software enabled booms, Airbus on operational tankers now and soon Boeing with its KC-46A.

As Air Commodore Lennon put it: “Every tanker needs to be capable of tanking every receiver. That is the goal."

"We do not want to have IP differences get in the way of that requirement.

"We need to shape a good level of data sharing without compromising the IP of the two companies.

“Software driven booms designed by dissimilar companies will respond differently to diverse operational situations and we need to narrow this difference for operational stability.

"We need as operators to set standards so different manufacturers can design their booms to respond in a predictable, pre-determined manner.

"Designers might shape different approaches via their software, so long as they deliver that common result.

"Legacy booms are mechanical and the operator drove the boom in accordance with standard procedures.

"The boom operator positions the boom to a common point in accordance with common procedures.

"We want to make sure that the software can achieve the same outcome.

"This is especially important where new booms have software driven functions such as automatic disconnect.

"It is important for the receiver to know what the boom will do next.”

We then discussed the progress in the automatic boom being worked with Airbus.

According to Air Commodore Lennon: “The best way to think about the new boom capability is that it is an automatic boom similar to how autopilot works in the cockpit. The automatic pilot simplifies the pilot load, but the pilot is still there and can override the autopilot in case of need.

There will always be an operator monitoring what's going on with the boom, deciding what the boom should do, and when it should do it, but now he can let the boom do all the work of positioning and marrying up with the receiver.”

The KC-30A is a refuelable aircraft so with a fatigue reducing automatic boom, the crew can stay airborne for longer to generate additional operational impact and enhanced sortie generation effects.

Air Commodore Lennon saw other potential impacts on operations as well from having an automatic boom.

“If it can anticipate and react to movements of the receiver aircraft faster than the boom operator can, then you end up with faster contacts. You also potentially end up with more consistent contacts when the turbulence level increases, in cloud or when night falls.”

We then discussed the partnership with Airbus through which the RAAF is working the new capabilities for the now fully operational KC-30A baseline aircraft or Tanker 1.0.

Air Commodore Lennon felt that “the agreement signed at Avalon represents a significant maturing of the relationship with Airbus.

"It was interesting that we declared final operating capability for KC-30A at Avalon and then within five minutes we were signing a cooperative agreement to take the capabilities of the tanker to the next level.”

Both Lennon and Williams saw the maturation of the relationship with Airbus as critical when moving towards Tanker 2.0.

"I think they've definitely turned a corner in terms of maturity. They are not just trying to sell airplanes anymore but operating as a global fleet steward.

"They are offering us a menu of choices for how we might modify the aircraft going forward, rather than selling us a single solution.”

We then returned to a topic which I had discussed with the Group Captain last August, namely the advantages of the pairing of the C-17 with the KC-30A.

The Aussies given the vast areas they cover use their tanker as a fully loaded fuel asset and given its significant fuel load maximises the number of receivers that can be deployed over long distances.

This means though that they want to fly with a C-17 to carry the kit, people and support equipment that is displaced by fuel on the KC-30.

Hence the importance of the pairing.

According to Williams there are two clear recent examples of how this works.

“We brought F-35s and Growlers to the Avalon air show and we did so by supporting them with a KC-30A and C-17 pairing. For long range operations, the pairing works very well for us.”

In contrast, for operations within Australia the tanker can be used not only to fuel but to lift personnel and cargo as well in many operational settings.

Editor’s Note: in December 6, 2016 story published by the USAF 88th Wing, the CARI validation process with the KC-30A and the B-1 was described.

WRIGHT-PATTERSON AIR FORCE BASE, Ohio – Officials in the Air Force Life Cycle Management Center’s Tanker Directorate, headquartered at Wright-Patterson Air Force Base recently announced the successful completion of refueling tests between the Australian Air Force’s KC-30 and the U.S. Air Force’s B-1B as part of the Coalition Aerial Refueling Initiative (CARI).

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From Oct. 25 – Nov. 9 the coalition team executed seven sorties totaling 27.4 flight test hours, encompassing 185 contacts and offloading a total of 275,150 pounds of fuel. The testing was completed two weeks ahead of schedule.

"CARI is significant because it fosters international cooperation by leveraging the combined assets of our coalition partners," said John Slye, director of engineering for the Tanker Directorate.

"This is not just a U.S. Air Force mission, but a global mission because of the reliance on aerial refueling as a force extender, force enabler, and force multiplier.

"The results of CARI offer a significant return on investment; providing aircraft refueling services and increasing tanker availability while improving the interoperability of the United States and its coalition partners."

http://www.wpafb.af.mil/News/Article-Display/Article/1021512/coalition-aerial-refueling-initiative-successful/

Tanker 2.0: Adding the Robotic Boom

2017-05-09 During an interview at the Amberley Air Base last April with Air Commodore Lennon and the 86th Wing Commander, Group Captain Adam Williams, we discussed the evolution of the KC-30A into Tanker 2.0.

One aspect of that evolution was the coming of the robotic boom.

According to Air Commodore Lennon: "The best way to think about the new boom capability is that it is an automatic boom similar to how autopilot works in the cockpit. The automatic pilot simplifies the pilot load, but the pilot is still there and can override the autopilot in case of need.

"There will always be an operator monitoring what's going on with the boom, deciding what the boom should do, and when it should do it, but now he can let the boom do all the work of positioning and marrying up with the receiver."

The KC-30A is a refuelable aircraft so with a fatigue reducing automatic boom, the crew can stay airborne for longer to generate additional operational impact and enhanced sortie generation effects.

Air Commodore Lennon saw other potential impacts on operations as well from having an automatic boom.

"If it can anticipate and react to movements of the receiver aircraft faster than the boom operator can, then you end up with faster contacts.

You also potentially end up with more consistent contacts when the turbulence level increases, in cloud or when night falls."

A press release from Airbus Military on May 9, 2017 focused on a recent successful test of this new capability.

Madrid, 9 May 2017 - Airbus Defence and Space has successfully demonstrated automatic air-to-air refuelling (AAR) contacts with a fighter aircraft from a tanker's refuelling boom – the first time in the world that this has been done.

Airbus' A310 MRTT company development aircraft performed six automatic contacts with a F-16 of the Portuguese Air Force in a demonstration of a technique which the company believes holds great promise for enhancing in-service AAR operations.

The system requires no additional equipment on the receiver and is intended to reduce boom operator workload, improve safety, and optimise the rate of AAR in operational conditions to maximise combat efficiency.

It could be introduced on the current production A330 MRTT as soon as 2019.

Initial approach and tracking of the receiver is performed by the tanker's Air Refuelling Operator (ARO) as usual.

"Innovative passive techniques such as image processing are then used to determine the receiver's refuelling receptacle position and when the automated system is activated, a fully automated flight control system directs the boom towards the receiver's receptacle.

"The telescopic beam inside the boom can be controlled in a range of ways including: manually by the ARO; a relative distance-keeping mode; or full auto-mode to perform the contact.

In the 21 March flight off the Portuguese coast, the tanker performed the scheduled six contacts, at flight conditions of 270KT and 25,000ft over a 1hr 15min test period. Both crews reported a faultless operation.

David Piatti, Airbus Test ARO, or "boomer", on the tanker, said: "The most important thing was that the system could track the receptacle. It was very satisfying because it worked perfectly and we could perform the contacts with the automation switched on as planned. It will certainly reduce workload, especially in degraded weather conditions."

The F-16 pilot, known by his callsign "Prime", said: "The test mission was pretty uneventful and accomplished with no unexpected issues – which is a good sign. From the moment that the boomer accepted the contact the boom was immediately in the correct spot. For the contact itself, it was very precise and expeditious. You can notice the difference – the less that you feel in the cockpit then the more precise you know the tracking is."

Miguel Gasco, Head of Airbus Defence and Space's Incubator Laboratory which coordinated the development, said: "This represents a fundamental advance in boom AAR operations, with the promise of increasing the rate of contacts, notably reducing operator workload, and enhancing safety. The automated boom operation is an important pillar of our Smart MRTT development that is already underway."

The imaging technology underlying the Automatic AAR technique was originally used by Airbus' Space division to develop solutions for refuelling satellites in space or for space debris removal and was further developed and applied by Airbus Defence and Space's Incubator Laboratory for the tanking application.

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Tanker 2.0: The A330 MRTT Evolving as a Global Fleet

2016-11-29 By Robbin Laird

The Airbus tanker is the only advanced tanker in operations and has been so for several years.

Airbus Defence and Space has sold tankers to a number of countries and has done so in what one might call national or serial sales.

Getting the tanker sold, and out in the operational space is shaping a baseline reality.

But with significant operational experience under their belt and with the focal point of Middle East operations, cross-cutting experiences are shaping the way ahead among the nations.

A baseline has been created from which what one might call Tanker 2.0 is emerging.

Tanker 2.0 can be understood in a couple of ways.

The first way is the coalescing of experience to shape a global fleet perspective whereby common experiences and con-ops shape the way ahead for the development of the tanker as well as providing an opportunity for global support.

The 330 Tanker program is not there yet, but with the experience of the nations under their belts and with the forcing function of operating in common in the Middle East, a baseline has been created which clearly can allow for this evolution.

In this phase of Tanker 2.0 the user groups can evolve in their importance.

There will soon be a user group meeting in Madrid. The evolution of the role of the user group was described by one Airbus Defence and Space official as moving in the early days from a brief BY the company to the users to the emergence of genuine interaction AMONG the users to dialogue with the company about the way ahead for tanker modernization and ways to shape a global fleet approach.

The second way would focus on how and paths to upgrade the tanker as a combat asset in the extended battlespace.

Because the plane carries the fuel for tanking in the wings, the internal space of the tanker, which currently is used for passengers or cargo, can be modified in various ways to be much wider combat support asset in the extended battlespace.

There is clearly thinking under way, notably in Australia, about how to take the tanker to this next step from being an MRTT in terms of combining lift and tanking functions to becoming a much wider combat support asset in terms of ISR, and C2 functions.

[caption id="attachment_72716" align="alignnone" width="300"]

Royal Australian Air Force KC-30A Multi Role Tanker Transport aircraft maintenance crew prepare to launch the jet at dusk, commencing another mission refuelling Coalition aircraft over Iraq. Credit: Australian MOD, 11/24/14

After my recent visit to the Albacete Air Base in Spain, I visited the Airbus Defence and Space facility in Madrid, namely the Getafe facility. I had a chance to discuss the baseline and the way ahead with the head of the tanker program, namely, Antonio Caramazana.

I first met Antonio Caramazana at an Airbus Defence and Space (then Airbus Military) Trade Media brief for the media in 2010. That briefing which he gave only six years ago shows how far the tanker has come in only six years.

http://www.sldinfo.com/an-update-on-the-a330-mrtt-2010/

We started by getting an update on the status of the tanker and discussing the baseline.

We then went on to discuss the evolution of the aircraft from a platform to a fleet, with the inherent opportunities to shape a global fleet solution.

Question: Certa 2016, what is the current status of sales and operational experience of your tanker?

Antonio Caramazana: We have delivered 28 tankers to date.

We have delivered 14 to the UK; 5 to Australia; 6 to Saudi Arabia and 3 to the UAE.

These aircraft already integrated into operations.

The fleet is operating and is demonstrating its value added.

And all are operating in the Middle East, which has provided a significant opportunity for the users to gain joint knowledge about the tanker and its capabilities.

They are even doing combined operations in a number of cases.

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Question: You have sold the aircraft to several customers, but rather than just serial sales, you are seeing cross learning?

Antonio Caramazana: That is true.

For example, in the case of the clearance of receivers of fuel from the aircraft, the traditional approach would see a case by case national approach.

But there a particular national user is doing clearances, which provide certifications for other national users.

This is a culture shift for the air forces, which is provided by having a common aircraft, which is recognized as such by the air forces.

In effect, we are already seeing a global fleet which broaden the impact of the tanker.

For example, U.S. aircraft are being tanked by the various national tanker due to certification being done by specific nations which then allow the U.S. to tank into other national tankers.

Question: The next phase, which I will call Tanker 2.0, is to shape deliberately a global fleet. What are some of the key building blocks in your view to going down this path?

Antonio Caramazana: We are developing a A330 MRTT advanced which is designed to deliver a common aircraft, with common upgrade paths and solutions.

This will allow nations to get better value for money for their modernization investments.

Common configurations will be better for operations, and upgrades.

It will as well enhance common solutions to training, to parts supplies and to maintenance.

This is a way ahead for what you are calling Tanker 2.0.

This provides for culture change for both the militaries and industry to shape such a global solution.

The more users that buy into a common solution, costs can be contained with regard to upgrades, training and maintenance.

It will also allow tankers from one nation to fly to an area of interest and potentially leverage the support structure of a nation operating the tanker in that region of interest.

And the life cycle costs for such a global fleet will be lowered as well.

Our user groups are discussing paths to upgrades, more effective maintenance approaches, and other ways ahead to shape global solutions.

This is the advantage of already having several years of operations behind us as well as an aircraft with significant room for expansion of onboard systems as well.

Question: But Tanker 2.0 provides for another way ahead, namely to expand the contribution of the tanker to other combat assets in the battlespace.

How would you describe this way ahead?

Antonio Caramazana: From the inception of the A330MRTT, we have put into the market a very flexible asset with multiple capabilities.

You can combine passenger lift, cargo lift and tanking within the same platform, and countries like Australia or operating their C-17s with their tankers in very flexible ways in terms of cargo and passenger lift operating over both platforms while the tanking function allows both to go to the area of interest.

At the same time, with the evolution of militaries look to shape enhanced connectivity in the battlespace, a key way ahead is to rethink how the tanker can support other combat sets in terms of ISR and C2 functions.

This is work in progress, but given the flexibility of the tanker in terms of internal space, there are many possibilities for users.

This is about having a smart tanker able to link assets in the battlespace, air, ground or sea.

It can provide an ISR and C2 node function for the joint force in the battlespace. It is an information age aircraft as well as playing more classical role of a tanker.

Just in Time for the Paris Air Show: The RAAF Conducts Mission 1000 with Its KC-30A Tanker

2017-06-18 Recently, the RAAF just completed sortie 1000 in its Middle East mission.

It has done so with a 93% dispatch rate and has provided approximately 10% of all coalition fuel in the overall coalition air operations.

They have done this by flying one aircraft!

As the USAF is still waiting for its first operational Boeing tanker, the Aussies are head towards shaping their Tanker 2.0 concepts of operations and capabilities.

It would make sense for the KC-30A to become the KC-10 replacement if operational realities and coalition performance is important to the DOD acquisition effort.

Or put bluntly, adopting advanced systems from allies makes a great deal of sense whether they be Wedgetail, KC-30As, SAMDIS underwater combat systems, MBDA Meteor missiles, etc.

Ramping up American combat capabilities is more important than simply always developing American; and any kit acquired from abroad is almost always followed by production domestically.

According to the RAAF in piece published on June 15, 2017:

The Air Task Group (ATG) of Operation OKRA, is operating at the request of the Iraqi Government within a US-led international coalition assembled to disrupt and degrade Daesh operations in the Middle East Region (MER).

The ATG comprises six F/A-18F Super Hornet fighter aircraft, an E-7A Wedgetail airborne command and control aircraft, and a KC-30A Multi-Role Tanker Transport air-to-air refuelling aircraft.

Additionally, the ATG has personnel working in the Combined Air and Space Operations Centre, and embedded with the 'Kingpin' US tactical Command and Control Unit.

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The ATG is directly supported by elements of Operation ACCORDION including the Theatre Communications Group, Air Mobility Task Group, and the Expeditionary Airbase Operations Unit, whose mission is to provide airbase and aviation operational support to sustain air operations in the MER.

There are up to 300 personnel deployed at any one time to the Air Task Group, with an additional 100 personnel deployed in direct support of Operation OKRA.

Australian Department of Defence

June 15, 2017

CONCLUSION

As the Pentagon reforms its acquisition approach, the ability to mobilize assets and to support them as was well as to accelerate modernization are clear priorities.

But missing from the discussion is the allied dimension in terms of accelerating US combat modernization. The shift from slo mo to preparing for high tempo and high intensity operations is a major challenge for the US military and its allies. It is about a culture shift, a procurement shift, an investment shift. But mobilization is even more important than modernization.

To get ready for the shift, inventory needs to become more robust, notably with regard to weapons. In visiting US bases, a common theme in addition to readiness and training shortfalls, is the challenge of basic inventory shortfalls.

The Trump Administration has come to power promising to correct much of this. But there simply is not enough time and money to do readiness and training plus ups, mobilization and rapid modernization.

Donald Trump as a businessman might take a look at how DoD could actually functions as an effective business in equipping the force and having highlighted the question of allies might be pleased to learn of significant allied investments in new combat systems which his own forces can use, thus saving money and enhancing capability at the same time.

One way to do so would be leverage extant allied programs and capabilities which if adopted by the US forces would save money but even more importantly ramp up the operational capability of the US forces and their ability to work with allies in the shortest time possible. By so doing, the US could target investments where possible in break through programs which allies are NOT investing in.

And at the heart of building a 21st century combat forces is the multi-mission software upgradeable platforms, such as Wedgetail, the F-35 or the P-8. And here the interactive relationship with allies is a key driver for change, but to really leverage it requires a significant change in perspective.

As the head of the USAF materiel command, General Ellen Pawlikowski, put it:

"*Agile Software development is all abut getting capability out there.*

"*The systems engineers approach drive you to a detailed requirements slow down.*"

She highlighted that this cultural barrier, namely reliance on the historical systems engineering approach, needed to be removed.

"We have to change the way we think about requirements definition if we're going to really adopt Agile Software Development.

"Maybe the answer isn't this detailed requirements' slow down."

"By the way, once you put it in the hands of the operator maybe some of those requirements you had in the beginning, maybe they don't make any sense anymore because the operator sees how they can actually use this and they change it."

She went on to highlight what the Aussies are doing in Willliamtown with Wedgetail without mentioning them at all.

"You need to put the coder and the user together…

http://www.sldinfo.com/software-upgradeability-and-combat-dominance-general-ellen-pawlikowski-looks-at-the-challenge/

Allies are already doing this, in this case of the RAAF and the Royal Australian Navy. If one would go to sea with the new frigates and watch how code gets rewritten that would be a harbinger of things to come for the US if we follow the technology rather than 20th bureaucratic rules.

And even more challenging is for the US to follow the technology with regard to its own multi-mission software upgradeable systems which as the General noted can not be rapidly upgraded with the current approach to modernization. And this will simply be unacceptable to allies operating such systems such as F-35 or the P-8. It is hard to imagine the Israeli Air Force simply accepting slo mo software development when the F-35 is becoming a centerpiece for the national survival.

Allies will drive change but why resist why not embrace it? Rather than following the outdated USAF practices of having a very long logistical tail to any aircraft flown to an area of interest, why not simply leverage global F-35 bases. Why not let "foreign F-35 maintainers" maintain US jets working with those maintainers who have been flown in by the USAF as well?

All that is required is to have an enterprise security clearance to maintain the common F-35, but this is hardly an act of God or even of bold imagination. It is act of responding to the strategic opportunities inherent in the new combat capabilities and the technology built into them.

High intensity warfare requires higher sortie generation rates of the kind inherhent in the F-35 global enterprise. But this will not happen if the USAF follows its legacy sustainment rules rather than opening the aperture to embrace common working arrangements with allies on "foreign" air bases.

And as the US looks to develop new capabilities, in many ways, a key way to accelerate modernization is embracing foreign capabilities. Notably, with regard to the new frigate program which is an essential element for augmenting the surface fleet, will not happen for a very long time unless the obvious is done. Pick a foreign frigate design and build it in the United States. And then search the global market for capabilities off the shelf, which can be put onto that frigate in a fast acquisition approach.

For example, the Australians have developed a world-class radar which is software upgradeable and very agile and adaptability on their surface ships. It has been developed in Australia by a company, which has Northrop Grumman with significant minority ownership in the company. It would hardly be difficult to transfer this technology to the United States and get it onboard the new frigate with a rapid technology insertion process.

Second Line of Defense

Obviously, the acceleration of US force modernization would occur from leveraging allied technologies. Just as obvious is that allied capabilities would be enhanced as well as the US invested in their efforts and cross-learned. Moving onto Wedgetail for the USAF is hardly a difficult concept and if the USAF did so rather than waiting for the distant future for a new plane, then USAF investments along with RAAF investments and perhaps those from South Korea could see the capability of the platform accelerate as well.

As a recently retired senior RAAF officer put it: "we could really make the Wedgetail awesome with some USAF technology injects. We could fund the upgrades which would take it so much further."

So let us get on with it if we can get out of the Washington DC hermetically sealed thought bubble.