The Maritime Services, the Allies and Shaping the Kill Web

9/15/17

A Work in Progress for the Air-Enabled Maritime Force

This report is based on interviews with the USMC, the US Navy, the U.S. Air Force, the Royal Navy, the Royal Air Force, the Norwegian Defense Force and the Australian Defence Force. The report highlights the transformation approach being crafted to build, deploy and develop an integrated 21st century combat force able to operate as a kill web.

The Maritime Services, the Allies and Shaping the Kill Web

A WORK IN PROGRESS FOR THE AIR-ENABLED MARITIME FORCE

Second Line of Defense

INTRODUCTION

Airpower and naval power emerged from World War II as integrated components able to fight in a single battlespace. For the navies, carrier aviation was the key element for air enablement along with land based air which could operate from key land based choke points to provide for key capabilities to assist in controlling the sea lines of communication.

With the emergence of fifth generation aviation, the manned-unmanned dynamic and the evolution of weapons, a new version of operating in the integrated battlespace is emerging.

The US Navy refers to this as the kill web, a capability to move from a linear kill chain to a distributed fleet able to tap into capabilities available throughout an integrated force. This is an aspiration more than the current reality, but the US and its core allies are working hard to move aspiration to reality.[1]

This special report looks at the emergence of the kill web from the perspective of the maritime and air forces.

We first look at some conceptual issues in terms of how to characterize the way ahead for the fleet as it integrates with land and sea based capabilities to deliver its combat effect.

A key element of the change is shaping a more distributed C2 structure with a mission command approach, rather than the kind of hierarchical structure which can be used in slo mo war.

The shift from the kinds of land wars fought in the past decade and a half to operating across the range of military operations to insert force and to prevail in a more rapid tempo conflict than that which characterized counter-insurgency operations carries with it a need to have a very different C2 structure and technologies to support those structures.

The shift to higher tempo operations is being accompanied by platforms which are capable of operating in an extended battlespace and at the edge of the battlespace where hierarchical, detailed control simply does not correlate with the realities of either combat requirements or of technology which is part of a shift to distributed operations.

Distributed operations over an extended battlespace to deal with a range of military operations require distributed C2; not hierarchical detailed micro management.

In effect, the focus is upon shaping the commander's intent and allowing the combat forces to execute that intent, and to shape evolving missions in the operations, with the higher level commanders working to gain an overview on the operations, rather than micro-management of the operations.

Unfortunately, the relatively slow pace of COIN, and the use of remotes (UAVs or RPAs) in the past decade have led to a growing practice of growing the level of command in order to try to exercise more detailed control. This has led to the current situation in the air operations against ISIS where you have more members of the CAOC than you have actual air strikes!

According to one of the architects of Desert Storm, Lt. General (David) Deptula, the CAOC for Desert Storm was quite lean, and the goal was to get the taskings into the hands of the warfighters to execute, with a later battle damage assessment process then informing decisions on the follow on target list.

It was not about micro managing the combat assets.

[1] The photo on the cover shows USMC F-35Bs operating with USAF strategic bombers in a strategic deterrent mission in South Korea. These aircraft can come from sea or land to work with land-based aircraft and that ultimately is the point of an air-enabled kill web. Credit: PACOM for the photo.

And this was with air power multi-mission assets, which went out to execute a command directive in a particular area of the battlespace to deliver a particular type and quantity of ordinance in that area of the battlespace.

With new air technologies, multi-tasking platforms will fly to the fight and execute the initial commander's intent but will shift to the mission as needs arise during the air combat operation. Fleeting targets are a key reality, which requires the ability for the pilots to prosecute those targets in a timely manner, rather than a deliberate C2 overview manner.

Put in other terms, the command structures will need to "lean out" and to work with warfighting assets where the pilots and operational decision makers are at the point of engagement, not in a building housing a CAOC.

http://www.sldinfo.com/c2-modernization-an-essential-element-for-21st-century-force-structure-innovation/

This requires building in a new approach to C2 from the ground up as the new assets are introduced into the force. For example, the introduction of the F-35 should bring with it a fundamental rethink away from hub-and-spoke C2 to distributed C2 and modular force package operating forces.

C2 for fifth generation aircraft is about setting the broader combat tasks and unleashing them to the engagement area, and once there they can evaluate the evolving situation during their engagement time and decide how best to execute the shifting missions within the context of the overall commander's intent.

Hierarchical command and control of the sort being generated by today's CAOCs is asymmetrical with the trend of technology associated with fifth generation warfare.

http://www.sldinfo.com/reshaping-operational-and-training-approaches-airpower-led-combat-innovation/

The emerging perspective which can be characterized as a kill web, or the "network as a weapon" or a "fifth generation enabled force" can be encapsulated in the following graphic, which reflects the convergent lines of transformation shaping a foundation for the next decade of change.

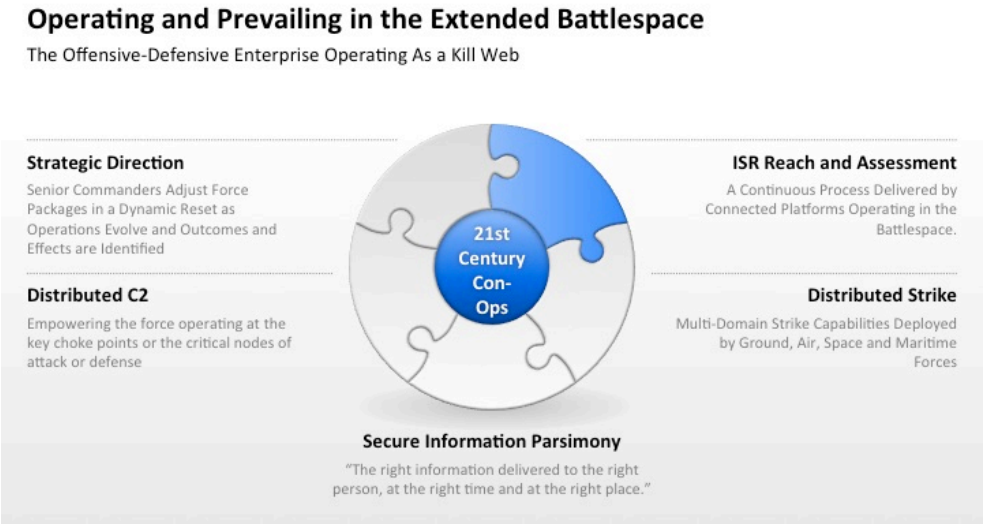

FIGURE 1 GRAPHIC CREDITED TO SECOND LINE OF DEFENSE

We next look at the emergence of key elements of the kill web entering service with today's US Navy, USMC, the RAF and the Royal Navy, and the RAAF and the Royal Australian Navy.

Our visits to FALLON, MAWTS-1, to the UK and to Australia provided several data points on how the U.S. and core allies are working on building out a kill web air enabled force.

We then look at the significant opportunities, which new training and development integration can provide to shape a more integrated force able to execute a kill web going forward.

Finally, we then address two case studies of the way ahead: working the unmanned-manned transition and the electronic warfare or the non-kinetic payload domain.

And we conclude with some thoughts from the newly appointed Air Commander Australia on the challenge of shaping an effective 21st century combat force.

SHAPING A KILL WEB: CONCEPTUAL ISSUES

Force Design for High Intensity Operations: Payload-Utility Capabilities and the Kill Web

August 27, 2017

By Edward Timperlake

This article argues that yayload utility can be a driver for understanding the future development of combat systems.

To understand Pu with full honor to John Boyd, it can be noted that Observe/Orient (OO) is essentially target acquisition, and Decide/Act (DA) is target engagement.

Thus there is a very simple formula, better and better TA and TE =more effective employment of all payloads available to the battle commander.

It is the process of understanding the huge complexities in such a simple formula that is the challenge.

In this article, I introduce these concepts as a way to understand how to shape and execute the kill web, or the distributed combat learning and engagement force.

Introduction

Prevailing in high-intensity combat is the seen in the differences between combatants.

The quality of uniformed military personnel is critical, and the ability to mobilize rapidly and effectively is crucial.

The tactical skills of combat leaders at all ranks are essential, and the correct focus on constant appropriate training makes it all come together.

U.S. military doctrine must always be dynamic enough to empower all the crucial intangible components when war breaks out.

In some nations, a sophisticated new weapon system can substantially augment the capabilities of its operators.

In other nations, that same weapon system can overwhelm its operators and prove virtually worthless.

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Similarly, one country may have the determination to extract the maximum potential from its weapons, while another with similar skills may lack the motivation, leadership and focus on training, training, and training, to exploit those same weapons.

If one was forced to measure either the capabilities of the weapons or the capabilities of their operators, the greater and more useful insight might be derived from the latter.

But there may be a way to combine military technology and the human intangible factor very simply, which is defining a Payload Utility Function.

Having sat through the late Colonel John Boyd's famous lecture twice, I developed a real appreciation first hand of his creating one of the most widely embraced ideas about combat dynamics ever formulated.

In those days, there was a significant adverse reaction against the F-4 Phantom II aircraft.

The complaint was that as originally designed it was a high-altitude interceptor.

In fact, in early pictures the two man crew Pilot and Radar Intercept Officer were depicted wearing high altitude pressure suits.

The primary weapons were missiles, the AIM-7 semi-active Sparrow and the IR fire and forget AIM-9 Sidewinder.

The early Phantom T/M/S had no gun.

In addition the cockpit was, relatively speaking, not maximized for looking out the window; it was almost a sunken cave.

Of course, the F-4 went on to be a very capable multi-mission fighter-bomber with 5,000 produced for many nations Air Forces.

The Phantom rapidly morphed from just an Interceptor to a "dog fighter" (it took Top Gun, the USAF Fighter Weapons School and the Israelis with many hours in type to be the best) and a Direct Air Support or deep interdiction aircraft and in Marine hands, became a formidable Close Air Support platform.

For example, a section of F-4s armed with four shot Zuni Rocket pods had a greater initial "broadside potential" of a WW II Destroyer's main weapons firing their 5 inch 54 gun mounts in an opening salvo.

Colonel Boyd had a real issue with the aviation design teams that in addition to the F-4, gave the USAF its famous Century Series, the F-101, F-102, F-104, F105, and F-106.

The comment was often made in those days by USAF Fighter Pilots, "Why are we flying Navy aircraft?"

In addition to the F-4, the USAF also had the Navy developed A-7.

John Boyd brilliantly challenged all designers too essentially replicate his great success in flying the F-86.

He made a very cogent case in claiming that modern fighters needed a "bubble" canopy and the best relative "energy maneuverability" possible as more powerful engines were being developed.

Boyd stressed P sub s diagrams.

Ps simply allows comparisons of aircraft at different altitudes to essentially see where the different "edges of the envelope" advantages existed.

With that knowledge and practice and being competently flown, a fighter pilot would have a significant advantage in engaging.

Understanding relative platform energy maneuverability, especially in F-15, F-16 and F/A -18 improvements in airframe/wing design and engine performance, would give a fighter pilot a significant advantage in a 1 V 1 "Knife fight " up to to "fur ball," which is colloquial term for a swirling engagement with many bogies and friendlies.

Using P sub s charts the pilot would know where to optimize the fight to gain an advantage.

To Boyd, visual lookout was essential and he was totally correct.

Finally, Section (USN/USMC) or two ship USAF and Division (USN/USMC) or four ship (USAF terminology) pairing tactics become a huge consideration.

Boyd again got it correct -- a "Bubble" canopy would make a huge difference in keeping mutual support and look-out doctrine in any air-to-air engagement.

Essentially his OODA (Observe, Orient, Decide and Act) began with looking out see the enemy, orient the fighter, decide if an advantage exists, OR not, and then act employing knowledge of the human/machine capability.

The remarkable combat success of the F-15 Eagle Fighter Pilots of over 100 to zero kill ratio owes a debt of gratitude to the late Col John Boyd USAF (ret).

The Mobilization/Modernization Dynamic

In the design era of Boyd's OODA formulation another technological imperative was just beginning to be seen -- advanced weapon designs.

Perhaps the best combat example is the successful laser-guided bomb attack on the Paul Doumer Bridge in the later days of the Vietnam War.

Paul Doumer Bridge in Hanoi was the victim of the first use of laser-guided bombs in Vietnam.

John Boyd was very concerned with Observe, Orient, Decide, Act and his Payload was essentially the squeeze trigger of his platform the gun.

From the history of Korea and MIG Ally:

THE F-86 ENTERED SERVICE WITH THE UNITED STATES AIR FORCE IN 1949, JOINING THE 1ST FIGHTER WING'S 94TH FIGHTER SQUADRON AND BECAME THE PRIMARY AIR-TO-AIR JET FIGHTER USED BY THE AMERICANS IN THE KOREAN WAR.

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While earlier straight-winged jets such as the F-80 and F-84 initially achieved air victories, when the swept wing Soviet MiG-15 was introduced in November 1950, it outperformed all UN-based aircraft. In response, three squadrons of F-86s were rushed to the Far East in December.

Early variants of the F-86 could not outturn, but they could out dive the MiG-15, although the MiG-15 was superior to the early F-86 models in ceiling, acceleration, rate of climb and zoom.

With the introduction of the F-86F in 1953, the two aircraft were more closely matched, with many combat-experienced pilots claiming a marginal superiority for the F-86F.

The heavier firepower of the MiG (and many other contemporary fighters) was addressed by fielding eight cannon armed Fs in the waning months of the war. Despite being able to fire only two of the four 20 mm cannon at a time, the experiment was considered a success.

By adding a "Payload Utility" function to the OODA dynamic, we can recognize the important growth of fighters from just a motor, a "bubble canopy, and a gun sight to embracing the important technology evolution/revolution of weapon design that advances how a nation's military can put all the pieces together with a central unity of purpose.

Focusing on Payload Utility can drive the appropriate integration of platforms and people in to the modern battlefield OODA loop.

The payload function is a critical determinant of combat success.

Any enemy of America that thinks our Joint Staff and the planning staffs in our Combat Commands do not have a firm understanding of the effects of munitions does so at their mortal peril.

In fact the greatest payload utility Airpower campaign "death from above" in history was Desert Storm.

Those planners were gifted in mixing and matching the utility of various payloads.

I have emphasized in my work, the innovations driven by the squadron pilots in thinking about the con-ops necessary to shape combat innovation. In the Desert Storm, case then Lt. Col. David Deptula exemplified how such innovation occurs and allows for the air enabled combat force to innovate and shape a war winning force.

Just like the recent MOAB in Afghanistan and the 59 out of 60 missile "shacks" launched by USS Porter and USS Ross against Syria, the individual and combined use of all American ordinance is well known and has been successfully used in combat.

From the Initial Jet Age to the Fifth Gen World

One command published a very smart payload document: "Commanders Handbook for Joint Battle Damage Assessment"

This publication was from the Joint War Fighting Center that became Joint Forces Command headed by General Mattis before then JFCOM was stood down.

http://www.dtic.mil/doctrine/doctrine/jwfc/hbk_jbda.pdf

Payload utility (Pu) in the terms of this think piece is seen as the end result of many human decisions aided by technology.

It is an attempt to bring together with a unifying central focus for analysis a coherent interconnected vision capturing both a shift in looking at legacy systems and a way ahead in modernization programs.

Modernization and mobilization must both exist in harmony.

There needs to be a mobilization planning and requirements focus at the Office of the Secretary of Defense level focusing on consumption rates, battle damage repair attrition analysis and the real industrial base response capability.

The evolving modernization and mobilization dilemma is to understand the dynamic and rapidly changing combat engagement thinking in melding legacy systems integrated with sensor-shooter 5th gen software upgradeable platforms.

The technological imperative to fully understand Pu (unfortunate paring of letters) in a much larger sense is very time sensitive critical, with Hyper-Sonic Cruse Missiles (HSCM), Directed Energy (laser systems) and possibility of USN "rail-guns" arriving soon.

The sum maybe greater than the parts if a new analytical paradigm of Pu is understood correctly.

After WWII, the jet engines started the same dynamic seen in the prop years –improved airframe system performance by improving speed, range and maneuverability.

But two new dynamics were added both related to "payload."

For a fighter in WWII, the "payload" was simple –what caliber and how many machine guns or cannons fit the design to give the pilot enough "deadly bursts" to kill several of his opponents.

In the jet age, the complexities of adding airborne systems and improving the weapons carried, changed the technology vectors of design considerations and introduced two more synergistic, but relatively independent research and development paths.

Airborne radar and sensors were added to fighters and those systems helped the payload—guns and early IR fire and forget missiles became more efficient with the AIM 9 sidewinder series.

But then, concurrently, independent performance was put into the payload by improving missiles and linking long-range (BVR) missile shots to radar technology.

At first, radar guided missiles needed continuous guidance from the fighter but eventually even radar guided missiles became BVR self-contained "fire and forget."

So unlike WWII research and development, where research on airframes and engines was the mantra, in the jet age there were two other huge design factors at work.

The first was always questing to improve the radar systems in the fighters and, secondly, as technology allowed independent designs could improve the weapons carried.

Yet again, the art of aeronautical design had to work in partnership with the science of military R&D.

Along the way survivability shifted from armor, speed, and focusing on a good canopy into the era of Electronic Warfare and now the incorporation of stealth characteristics through both design considerations, composite materials and the wonders of chemistry for paint.

Second Line of Defense

Stealth is a survivability factor and is critically important because it multiplies the effectiveness of the fighter—one doesn't add stealth but incorporates it into the very existence of the fighter.

Being a multiplying factor means it is sensitive and can really drive the entire performance of the airframe and system combat performance.

So ending the 20th Century the complexities of fielding the best fighter was a much bigger challenge because of three synergistic but independent factors–basic airframe performance improvements, internal system R&D and constantly improving weapons.

Like John Boyd using his F-86 experience to formulate the OODA loop, the F-35 can be the starting point for understanding the unifying and driving force of Payload Utility added to OODA loop thinking.

The XXIst Century Man-Machine Revolution: A New Distributed Information Capability and a Potential Spiral Development Design Process:

With the very real computer revolution moving with light speed into the 21st Century there is now a fourth design dynamic at work —the man-machine interface.

Three-dimensional sensing and being able to distribute information to other warfighters, airborne and on the ground or at sea, the relationship of the individual pilot to knowledge of the bigger air battle is truly revolutionary.

This is brand new and will provide a foundation for further developments in the payload-utility domain.

For example, one of the most important capabilities of the F-35 is the distributed information capability.

The least experienced fighter pilot to the most experienced, all flying into the air battle in yet to be developed formations are all equally capable of having the same knowledge and situational awareness.

Consequently, in the formation if one pilot gets inside the opponents OODA loop (observe orient decide act) all are capable of having that same joint knowledge.

The revolutionary point is the enemy can splash an individual F-35, but cannot kill the knowledge gained by all: that aspect of modern warfare is truly unique 21st Century technology brought to an air battle.

On the offensive, if one F-35 picks up an enemy's airborne vulnerability such as an aircraft system or weapon frequency emission or stealth breakdown it can be sent to all.

Thus, another unique aspect of F-35 21st Century capabilities is that every Lightning II is a real time intelligence dissemination system.

The Combat Learning Dynamic

Additionally for combat learning, the entire engagement can also be captured electronically for immediate and direct refinements to tactics and analysis at the Marine Air Weapons Training Squadron, Navy Air Warfare Development Center and USAF Weapons School during the air battle.

Put another way, the training dynamic can go from training prior to deployment to engagement in combat learning while combat is under way. This is a work in progress but inherent in the new technologies and the new combat learning cycle.

These three different services graduate schools of studying and perfecting combat flying.

USMC- MAWTS, USAF -Weapons School, and the Navy's-NADWC, are the absolute top of the Combat Airpower pyramid in both turning out the best combat instructors while also focusing on a flying curriculum to embed selected Squadron Pilots who undergo their post-graduate train back into their Squadrons in order to instill in all their mates the most current tactical thinking on how to fly, fight and win any air battle in any threat conditions in any part of the globe.

http://www.sldinfo.com/squadron-fighter-pilots-the-unstoppable-force-of-innovation-for-5thgeneration-enabled-concepts-of-operations/

In this new century, the concept of each pilot being a three dimensional warrior with superior knowledge has been pioneered by the USMC aviation community.

The F-35 is not designed for the early century's concept of the "dog fighting" -- the knife fight.

It has the growth potential for internal changes to its systems to always incorporate the best weapons while expanding empowerment of combat pilots to have three-dimensional knowledge to elevate the fight to a new and different level.

Like Boyd stressing studying Psub s graphs, the F-35 can refocus on 360 three-dimensional information fused into actionable intelligence to begin to learn how to fight a new fight.

A knife fight dynamic in 1 v 1 is a pilot needing to use "Guns D"—throw the aircraft all over the sky to break a tracking solution-if that flying skill is needed than the pilot has failed at a certain level.

The F-35 can pioneer a different type of engagement like earlier pilots avoiding having to do a "Guns-D" to always keep an advantage.

It will take years to fully understand and evolve the combat tactics of the F-35 as a driver of the kill web.

The F-35 may actually be its own follow-on.

So any discussion of "what is a 6th gen Fighter" might be premature.

Instead of the old paradigm of needing to completely build another fighter to move from the WWII Battle of Midway F-2A "grape" to Joe Foss and his Green Knights flying the F-4U "Whistling Death," the Marines can just change and update their F-35 system, sensors and weapons.

The Marines are already IOC in flying the F-35B with a pre-planned product improvement design philosophy.

It is a software upgradeable platform to pull and replace or add system capabilities and thus have total flexibility to add new sensors and improved AA missiles and as non-stealth "bomb truck" is carries more than current F/A-18 with much great accurate battlefield sensing.

Again this makes the case for understand better a Pu function beyond just ordinance carried.

Evolving concepts of USMC operational development is at chapter one, because recognizing and exploiting man-machine three-dimensional knowledge is truly a brave new world.

Consequently, all F-35 T/M/S are capable of constantly updating into the next generation of U.S. fighters but not by building a new airframe but staying inside the F-35 basic airframe and adding the next generation of systems and weapons.

Second Line of Defense

It will take about 10 years of U.S. range time and combat experience to figure out all the competitive advantages of the F-35 and a weapons revolution.

The learning curve to improve sensors, system capability and weapons carried quickly compared to building another airframe may be a new American and allied way of industrial surging.

The arsenal of democracy may be shifting from an industrial production line to a clean room and a computer lab as key shapers of competitive advantage.

For the first time in history, individual F-35 pilots –A, B or C – will have the best database of real time knowledge in the history of combat aviation.

And all of this is internal to their cockpit and enabled by advances in computer processing and sensor information fusing.

Each F-35 pilot combined with human sensing (seeing visual cues outside the cockpit) will be enabled by machine driven sensor fusion to allow combat "situational awareness" (SA) better than any other opponent.

Concurrent with their ability to look-see, which is limited by physical realities, the F-35 pilot will be able to "see" using cockpit electronic displays and signals to their helmet allowing them not to just fight with their individual aircraft but be able to network and direct engagements at significant range in 360 Degrees of 3 dimensional space out to all connected platforms.

A fleet of F-35s will be able **to share** their fused information display at the speed of light to other aircraft and other platforms, such as ships, subs, satellites, and land based forces, including UAVs and eventually robots.

Tactically, "Aegis is my wingman, ""SSGN is my fire support" will be developed for conventional warfare.

This enables a "tactical" aircraft to evolve into a key technology for strategic operations and impacts.

Tron Warfare and the Z Axis

The F-35 is known as a 5th generation player in the state-of-the-art for both the Air-to-Air Fighter and Air-to-Air Attack combat roles.

It also adds an "electronic" or "tron" warfare component to the fight.

Electronic Warfare (EW) is a complex subject with many discreet but also connected elements.

EW was designed inherently into the F-35 airframe and Fusion Cockpit.

EW can include offensive operations to identify an opponent's emissions in order to and fry spoof or jam their systems.

In successful "tron" war, often-kinetic kill weapons can be fired. An F-35 can be a single sensor/shooter or off load its track to other platforms such as; planes, ships and subs and eventually UCAS-Unmanned Aerial Combat Systems.

The kinetic kill shot is usually a high speed missile designed to HOJ (home on jam). It has been said on the modern battlefield — air, sea or land — if not done correctly, "you emit and you die."

This is the beginning of a combat aircraft design that is building along a new axis-the "Z-axis." The "Z axis" is a core discriminator. The F-35 aircraft is not a linear performance enhancement from F/A-18 4th Gen; it has a third performance axis "Z."

A key enabler of reshaping of capabilities is the range of capabilities evolving along the Z axis within the cockpit.

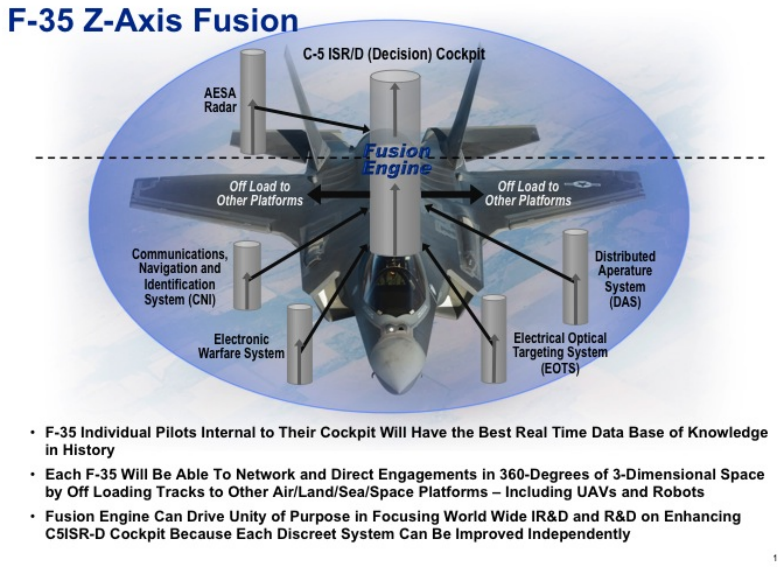

FIGURE 2 CONCEPTUALIZING THE F-35 IN THE KILL WEB. CREDIT: SECOND LINE OF DEFENSE

The "Z" axis is the pilot's cockpit OODA loop axis.

Starting at the beginning from air fleet Command and Control during WWI C&C has morphed into C5ISR (getting silly) – Command, Control, Communications, Computers, Combat Systems, Intelligence, Surveillance, and Reconnaissance

Traditionally, in looking at the progression of aircraft a two-dimensional design depiction has been used; the x-axis or horizontal axis is time and the horizontal y-axis is enhanced technology performance.

That type of graph captures individual airplanes in generational shifts.

Combat aircraft tend to cluster in generation improvements. Each aircraft clustered in a "generation" is only a combination of platform airframe/ engine improvements.

The aeronautical design "art" of blending together ever improving and evolving technology creates improvements in a linear fashion, if not performance would eventually go asymptotic. The airframe design characteristics blended together prior to F-35 have been constantly improving range, payload (improved by system/and weapons carried), maneuverability (measured by P Sub s), speed, and range (modified by VSTOL–a basing mobility plus factor).

The F-35 is also designed with inherent survivability factors, redundancy and hardening and stealth. Stealth is usually seen as the 5th Gen improvement.

But reducing the F-35 to a linear x-y axis improvement simply misses the point.

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The F-35 is now going to take technology into a revolutionary three-dimensional situational awareness capability.

This capability establishes a new vector for TacAir aircraft design, embracing software upgradeable platforms and weapons.

This can be measured by a three-dimensional plot incorporating a "Z" axis.

The "Z" axis of cockpit fusion engine dynamics of incorporating software upgradeable system performance is a new R&D vector in combat aircraft design. In brings the OODA into a marriage with advanced technology sensing and hence more effective payload delivery.

Like Boyd using his F-86 for OODA, the F-35 is not only advanced OODA, but platform OODA for OODA sake is not enough, because now the payload carried by the combat force is everything.

It is now much more than a gun or early AA missiles, which constrained Boyd's thinking.

Just like the example of laser guiding a bomb to destroy the Paul Doumer Bridge, a new chapter in technology and warfare has been captured in the fifth generation combat world by two USMC Fighter Pilots.

The first is Lt. Col. Chip Berke-USMC-a former Top Gun Instructor, USAF F-22 exchange Pilot and CO ofVMFAT-501 a USMC F-35 Squadron quipped in an open discussion when challenged by an F-22 pilot-

"I will win the fight because "I will fry you before you see me."

The second was underscored in our discussion with then Major Greg Summa a USMC XO of an F-35 Squadron who as an F/A-18 pilot had attended the Navy Fighter Weapons School (TOPGUN) and completed the Strike-Fighter Tactics Instructor (SFTI) Course said in flying the F-35 on a range against enemy capabilities-

For example, if I need an electronic warfare tool set, with the F-18 I have to call in a separate aircraft to provide for that capability.

With the F-35 I have organic EW capability.

The EW capability works well in the aircraft.

From the time it is recognized that such a capability is need to the time that it is used requires a push of a button.

Consequentially the "F/A/E"-35 can both fire/drop kinetic weapons or radiate directed "trons" as a payload function a truly new technology age is upon us.

Historically, Command and Control (C&C) was external to 1,2,3, 4th and some 5th Generations of TacAir. Now way overly complicated known as C5ISR the goal was still enhancing fleet wide combat performance for all Type/Model/Series (T/M/S) of TacAir.

This is the historic AWACS and Red Crown (USN ship) hub and spoke battle management concept.

But by using a three-dimensional graph, one can understand that a "Z-axis" (3 dimensional plot) takes airpower into a totally different design domain.

The shift can be exemplified by ditching C5ISR and going back to the need for the best robust and survivable higher echelon Command and Control (C&C or C2).

Setting aside Admirals like to be Admirals and Generals like to be Generals, "commanders guidance" will eventually evolve to empower independent action and combat deeds at the operator level. Fortunately American think like that and this is the revolutionary step function that breaks the linear progression of previous generations.

The "Z" axis in which the F-35 is the prototype is the first fusion 360 "reach not range" information into the individual cockpits. Not only does this enhance the Payload utility of the indigenous weapons carried but such a capability unifies and empowers a fleet wide target acquisition capability and target engagement capability. Put in other words, the ability to tap into the resources of the entire combat fleet can be energized.

For example, as stated previously I briefed "Aegis is my wingman" and "an SSG(N) is my fire support" to the Air Force Association Conference. The power of that statement is seen in a previous Chief of Staff of the USAF discussing one shooter having the missile launched but captured by a sensor for guidance to a kill.

This is the dawn of a new Pu paradigm.

A design focus of F-35 is the cockpit, and helmet displays of trusted fused integrated systems. Enabled with that technology the pilot can also be a distributed information decision-maker.

This is the Z axis in action and the enabler is the trusted "fusion engine."

Fleet wide information sharing among services and allies may be a huge factor in winning an air campaign and a war.

The Payload-Utility Dynamic And the Kill Web: Leaving the Legacy Kill Chain in the Rear View Mirror

Therefore my latest research, which is an attempt to bring focus on a simply stated observation, has profound complexities in execution.

Payload utility can be a driver for understanding the future development of combat systems.

To understand Pu with full honor to John Boyd, it can be noted that Observe/Orient (OO) is essentially target acquisition, and Decide/Act (DA) is target engagement.

Thus there is a very simple formula, better and better TA and TE =more effective employment of all payloads available to the battle commander.

It is the process of understanding the huge complexities in such a simple formula that is the challenge.

Understanding the technology and human dynamic through an analytic filter of a Payload Utility function consisting of weapons (kinetic and TRON) and the dual components of Target Acquisition (TA) and Target Effectiveness (TE) effectiveness in a fighting fleet engaged in high intensity combat in the unforgiving cauldron of battle maybe a war winner.

Either in one platform, or melded into a unified fighting Fleet to bring all different types of appropriate "weapons on" for the kill shot is a powerful concept.

America must always appreciate that no platform should fight alone if the Wynne Doctrine, named for 21st Century Secretary of Air Force, is employed: "If it is a fair fight someone failed in planning."

Second Line of Defense

A very simple filter to look at platform and weapon development within the integration of current weapon systems and platforms is asking the largest questions possible and pursuing force design and operational answers to these questions:

What does weapon or system add to fleet Pu?

How does this system help in TA?

How does this system help in TE?

What is the best weapon for the highest Pk against the target?

Is the TA, TE and Weapons (kinetic and Tron) carried together F-35 or separate?

If separate such as P-8 and fleet being aided by UAS Triton is the C&C robust enough to keep both the single engagement and also the overall battle focused with "weapons free"?

The demonstrated performance of all weapons and systems working together becomes of paramount importance because everything must be in support of a successful kill shot or what one might consider to be a kill web, rather than a legacy kill chain.

Information collected without full understanding of the unifying driver of integrating the proven utility of all payloads may simply lead to a disaggregated numbers game against the PLAAF and PLAN.

And in that game, the great but also true cliché comes into play: "Quantity has a quality of its own."

Boyd had a very powerful message in his lecturing about advanced technology; he complained that it just doesn't work.

The corollary to that point is that he was 100 % correct but eventually American technological virtuosity and diligence can produce the best weapons in the world that do work.

In this sense, quality has a significant impact all on its own as well.

My AIM-7 Sparrow was a perfect "water seeker" on a missile shoot but gave way to the excellent AIM-120 AMRAAM

Consideration of TA and TE in contributing to Payload Utility (Pu) allows an analysis of the appropriate integration of people, sensors and weapons.

Understanding the technology and mission trade-off by platforms in the continuum of TA and TE could be a structured way ahead for understanding and analyzing 21st Century man-machine information and learning dynamics.

Beginning with the F-35 and branching out to all platforms in a fleet it is my working hypothesis that the F-35 can actually be the driver in moving from intellectually constrained linear thinking about "kill chains" into the new dynamic of "kill webs."

This is way beyond just effects based outcome analysis in that Pu incorporates consideration all systems coming to the fight, inside a "Kill Web" driver.

Rear Admiral Manizer, the former N-9, nailed the shift in thinking planning training for empowering "Kill Webs":

"One of the key aspects of changes involves weapons in the kill web. Target identification and weapons delivery will not be necessarily located on the same platform. Indeed, the ability to deliver lethal effect in the electro-magnetic battle space will be distributed throughout the kill web. Weapons are distributed throughout the kill web and can be fired by platforms also operating throughout the kill web capable of firing weapons not carried by that platform.

Distributed strike will become increasingly significant as well as weapons modernization accelerates and the problem of providing new capabilities to the force, a force that is distributed in operations."

There are several significant force design considerations, which flow from a payload-utility kill web approach.

If Pu was the driver year back then the Littoral Combat Ship would have been looked at differently-what TA, TE and Pu does it bring to the fleet-or is an expensive one off?

There is not sufficient knowledge of emerging fleet TA, TE and hence better Pu on ranges to design a 6th Gen Fighter, whatever that means.

Currently the U.S. and core allied militaries is in an "applied physics" phase of 21 Century combat development, the early 21st Century information revolution could be considered the 'theoretical physics" phase.

I firmly believe that embracing the central theme of a payload utility function can greatly help resolve the laundry list of technological complexities in the "3rd Off Set Strategy"" which was in vogue during the Obama Administration.

Pu is "Kill Web" compatible; "Kill Chain" is simply linear thinking.

Keeping ideas simple is a gift to all in creating the most effective military in the world.

For clarity of first building a combat capable military one may also set aside a lot of Sun Tzu's profundity.

He is often quoted to confuse or divert from the central focus of what is brutally quipped as the first purpose of the USMC, by Marines— support equip and train "A Big Green Killing Machine."

Although, General/Philosopher Tsin Szu did get one thing absolutely right; "Victory usually goes to the army who has better trained officers and men."

A little noted American President James A Garfield was a combat veteran fighting in vicious battles as the country was torn asunder.

From his history; Garfield opposed Confederate secession, served as a major general in the Union Army during the American Civil War, and fought in the battles of Middle Creek, Shiloh, and Chickamauga.

He made a profound and lasting statement about ideas: Ideas are the great warriors of the world, and a war that has no idea behind it, is simply a brutality.

Second Line of Defense

Rethinking the OODA Loop for the Offensive-Defensive Enterprise

2014-11-08 By Michael W. Wynne

In the development of airpower, one has to look ahead and not backward and figure out what is going to happen, not too much what has happened.

— Brigadier General William 'Billy' Mitchell, USAS 1926.

Although we are only fourteen percent of the way through the 21st century, it is not too early to begin asking ourselves what constitutes airpower in 2014.

Already, we have enjoyed over one hundred years of maturation that has been complemented by a diverse array of scientific advancement serving to augment our notion of flight.

To wit: we have gone very slowly with vertical take-off and landing, very fast with the breaking of the sound barrier, and we've achieved commercial and military supersonic transport capability.

Most experimentation, however, was conducted during the first half-century of flight, and this advancement culminated with manned space exploration and a future frontier that has been left to a new generation of explorers.

The airpower domain in its present construct lies in a controlled state where actions can be planned, modeled, and forecast with routine predictability.

This configuration, while a familiar and reliable process, has unfortunately led to atrophy in our quest to inject modern and innovative means into this domain.

In contrast, what we are witnessing in China is great enthusiasm for their space program as well as a drive to shape new and modern aerospace strategies.

The biggest challenge we may well face from China is our own lack of enthusiasm and a complacent assumption of superiority that was born from past achievement but not paid for in the achievements of the future.

From our perspective, cost has become a driving factor that puts the air domain well beyond the scientific realm and into the context of engineering.

Unfortunately, financial constraints have hampered the competitive spirit that brought us so much success in the past, and it has opened the door for competitive nation-states to overtake our capability and it positions them to best us in both domestic and global respects.

What does seem clear is that modern breakthroughs of the late 20th century featured fast transmission of information.

This led to concepts such as information as an asset and displays allowing great portability of decision making processes.

In military terms, this translates into situation awareness, and command and control.

This flattens hierarchies; and puts decision control closer to the point of application of weapons.

As this was largely an inspiration of American Ingenuity, it seems easy to forecast this infusion into Airpower in the coming decades.

This allows for connectivity much talked of, and seen between the ground, maritime, and air domains, throughout the beginning stages of this century.

Conceptualizing the Way Ahead for Airpower: Rethinking the OODA Loop

We have reached a point where we must assess the airpower domain, and this should be accomplished using an appropriate contextual approach.

One approach that bears examination includes the underpinning of our armed forces' raison d'être as cited in our constitutional preamble: "To Provide for the common defense" of the nation.

Utilizing this founding premise as a fundamental benchmark, we will assess whether we continue to appropriately fulfill this critical mission.

Globalization may have brought the world closer together in terms of collaboration, but the United States remains a singular continent that can now be reached by the forces of military globalization, missiles and nuclear weapons.

Without air superiority, we can neither defend our land nor project power abroad.

If we rest our assumptions of superiority on an aging stock of proud yet outdated airplanes, we can never hope to prevail in the face of rising and adventurist powers like China and other modern adversaries.

In this piece, I would like to examine a way forward in understanding how we can recapture air superiority and the enthusiasm necessary to build and sustain it.

I am going to champion the ideas of John Boyd that, while initially targeted towards individual pilot, can also serve as a tool to building overall force capability in the next twenty years.

Leveraging the OODA Loop

A significant component of our mission is to preserve America's ability to act in its best interests and preserve national security.

In this context, let us look at the contribution of the airpower domain as a part of the larger Observe, Orient, Decide, Act (OODA) Loop- a concept first brought to our attention by military strategist Colonel John Boyd ("The Essence of Winning and Losing,"1996) when dissecting air combat. Boyd breaks this cycle into four interrelated and overlapping processes through which one cycles continuously:

Observation: the collection of data by means of the senses

Orientation: the analysis and synthesis of data to form one's current mental perspective

Decision: the determination of a course of action based on one's current mental perspective

Action: the physical playing out of decisions

In later years, Boyd expanded the OODA Loop concept and applied it to other forms of competition in society.

This included multiple sensor functions that deliver data or convert it into amplifying information.

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Further, the Loop was applied in academic circles as it examined mental processes and allowed for a different approach to cultural, genetic and other inputs that arrive in later stages of the orientation period.

According to Boyd, decision points and sound courses of action are achieved by converting a wealth of information into useful, actionable data.

This provides a person with sufficient command and control relative to a situation, and ultimately this guidance allows for the successful carrying out of one's objective within the OODA Loop construct.

This procedural overview provides some intellectual backdrop as we take a good look at airpower in the 21stcentury, and as this discussion has already argued, shaping a force that leverages the OODA Loop is a key strategy in the way ahead.

Strategic Dominance

Another element that bears examination is determining whether the Air Force has remained on the strategic path fostered by the Mighty 8th in the Second World War, and also espoused by General Curtis Lemay.

Are we committed to strategic dominance in airpower, or are we just willing to have a checkmate with our adversaries and potential adversaries?

With the end of the air battle in Europe, the Army Air Corps and the services certainly understood that without air superiority and dominance, the Nazis would have been difficult to dislodge- let alone to defeat.

But what about today's Air Force?

Does it adopt a "just enough" approach in supporting the coalition of the willing-but-unable, or does it continue to serve as the strategic backbone for deterrence and global warfighting?

Combining this optic of strategic dominance with a macro look at the OODA Loop, how does our current approach stack up?

The Air Force Vision for 2013 was released just as the new Chief of Staff was feeling the harsh realities of a constrained fiscal environment.

With such restrictions in mind, his vision would ultimately be considered an aspirational perspective, in spite of the ideas communicated by the Commander.

Still, his guidance could not be wholly disregarded, as it remained instructive in measuring his strategic ideas against the intellectual foundation of the OODA Loop.

A look at excepts of the Vision Statement will provide a better understanding:

"The world's greatest Air Force – powered by Airmen, fueled by innovation

The Air Force's enduring contributions are rooted in our original roles and responsibilities that were assigned in 1947.

Today we call them:

(1) Air and space superiority;

(2) Intelligence, surveillance, and reconnaissance;

(3) Rapid global mobility;

(4) Global strike; and

(5) Command and control.

We already combine our air, space, and cyber forces to maximize these enduring contributions, but the way we execute these five calling cards must continually evolve as we strive to increase our asymmetric advantage.

"To strengthen our enduring contributions, the Air Force will:

• Deter and defeat adversaries with a credible first look, first shot, and first kill capability;

• Hold our adversaries and what they value at risk while operating on a global scale with unmatched joint integration;

• Exploit and defend air, space, and cyberspace, especially in contested environments, while denying our adversaries unrestricted use of the same;

• Integrate and organize our Active, Reserve, and Guard forces to leverage the unique strengths and perspectives of each to seamlessly execute Air Force missions;

• Enhance relationships and interoperability with our sister Services, other government agencies, allies, and partners;

• Better train Airmen to bring their unique specialties together in more realistic, intense, and diverse environments to advance integrated airpower operations;

• Emphasize readiness to ensure the highest quality force, regardless of size;

• Modernize our capabilities to reduce operating costs while attaining desired effects with greater persistence, survivability, longer range, and more versatile payloads."

While this language provides more of a forward looking and futuristic perspective, it is also important to consider the past if we are to gain some grounding in moving forward.

An example of this involves the modern day dilemma of incorporating the cyber mission into The Mission of the Air Force.

At present neither the Air Force nor the nation possess superior capability within this discipline, however it should be remembered that Air and Space missions once undergone similar struggles while in their formative years.

In this regard, it is important to not only look forward, but also rely on lessons learned of past initiatives.

The OODA Loop As A Measuring Stick

Casting the new Air Force Vision against the underpinnings of the OODA Loop is a revealing and worthwhile effort.

In this section, each step in the Loop cycle will be applied to our modern concerns with reinforcing airpower.

OBSERVE

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Strategically, intelligence, surveillance, and reconnaissance (ISR) activities fits nicely into the Observe element, as does the emphasis on Space operations.

This is all about gaining access to information that might otherwise be denied, but there is also an emphasis on enhancing relationships and interoperability with our 'go to war' partners.

In this modern era of social media, this reach must now extend to areas undergoing current analysis- to include the Observable Data that is captured by all of the flying or orbiting sensors that the 'go to war' partners currently provide.

This is element is one that our intelligence services currently grapple with, and it goes hand in hand with managing the impressive flow of observable data that is shared all around the globe each day.

With the acceleration of modern technology and the capability to collect increased amount of data, it is incumbent upon the Air Force to recognize that significance of this influx of data.

An increased awareness across the service will facilitate the possibility that information sharing will be achieved between its forces and allied or sister service sensors.

For the moment, let us presume that the groundwork exists to increase the flow of data and apply advanced analytics to enable awareness of all available observable facts.

Let us also presume that these data points can be converted into actionable information that is readily available to commanders and planners.

In achieving this, we can fulfill the requirements of step one of the OODA Loop by fully addressing the Observe function.

For the purposes of the Air Force, this must mean that an investment stream is effected that can extract maximum knowledge from all information culled 'see deep' radars- whether they are on airborne, maritime, or space platforms.

With such an abundance of tactical data, the critical question becomes, "Where do all of the captured observations go, and how will they contribute to the next step in the OODA Loop with respect to achieving airpower?"

ORIENT

Looking at the Orient part of the OODA Loop, the Air Force Vision emphasizes readiness and training in two major areas: training for airpower exercises (which points to the exploration of capabilities), and limits or surprise elements that may be available to the engaged forces.

Such readiness and training in the form of joint and partner exercises will add to the critical leverage and agility in this step of the planning cycle.

Admittedly, training the decision makers in force capability can be a tricky element.

Most have grown up inculcated by only their service orientation, and any shared knowledge for sister service capabilities is only superficial because it is brought to the table from outside of a particular service's native environment.

It takes engagement in joint exercises before one can truly begin to understand how unfamiliar systems can boost operations during an engagement.

It is this element of synchronizing our resources that is explored in the concept of operations, and it underscores the importance of recognizing alternatives that can fill a gap in capability.

This concept must be resident in the mind of a commander if he or she wishes to seek and successfully solicit methods capability of achieving his objective.

Concepts for joint effect such as The Long Reach of AEGIS (published in the U.S. Navy publication Proceedings) aptly demonstrate this compounding effect of application of our modern systems.

It is this synthesis of data that serves as the benchmark of the Orient portion of the OODA Loop.

Situation awareness can now be shared among combatant units from ground and maritime units with their air elements and with strategic air elements to both deter or destroy aggressors, and so in real time Command Authority intent can be rapidly translated to action and effect.

At its most basic essence, orientation really drives at the nature of readiness.

In the modern warfare environment, warfighters cannot be effective if they only possess an understanding of the capabilities of their own platforms.

In order to fully understand the synergy and extension available through the interaction of the various offered platforms, they must be smart on assets available from the 'Go To War' partners.

Further, data flow in the modern day has become far more automated as transmissions occur from machine to machine and no longer requires a question and response trigger in order to facilitate communication exchange.

This automation impacts the Orient step at an individual level as the lone Battle Manager must ensure a "human" and therefore logically sound synthesis of information is achieved.

This step away from automation at the ground level is critical as assessments and judgments are often fed directly to strategic decision makers and perhaps even the National Command Authority.

The discussion on Orientation could extend, as it does during wargames, from the diplomatic level to the time-sensitive and wartime scenarios of competitor reactions and tactics.

It is important, therefore, that we not limit ourselves to only the decisions executed by higher-level strategists and decision makers.

As previously mentioned, Colonel Boyd developed his theories by examining 'dogfights' between two competent fighter pilots.

In the modern day, it is a rarity to witness this 'mano a mano' conflict, and for the focus has shifted to training towards a 'many on many' premise, ideally with leverage from numerous available systems and support platforms.

It is a far more difficult and complex problem to match our force against the evolving combat environment, and the capability to conduct dogfights has been replaced by the need to influence events in a 360 degree operational space.

Today there are far more systems working to deny us the capability to maintain airpower superiority.

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Interestingly; our army and naval commanders are already familiar with the depth and breadth of synthesized planning as they participate in fleet and theater operations in a joint environment.

In the past many of these same strategies have been applied as air armada operations reprising World War II tactics have been utilized.

These pre-strike sorties have enable understanding of enemy strengths and weaknesses, in addition to accurate targeting data and localization of anti-access systems.

Dynamically, the use of fifth generation aircraft as target location systems may not be seen as satisfying to the traditionally trained pilots, but it can serve a vital role for forward observers in concealed locations.

If executed fluidly, the flow of information on targets can be near real time so that the data is oriented and proved useful to commanders in pressing a plan.

In sum, the 360-degree revolution and the ground-to air revolution that is already witnessed with the remotely operated visual enhanced receiver (more commonly known as ROVER) provide a key perspective to shaping the future of airpower, as well as a view of airpower beyond what the USAF traditionally considers its operating domain.

DECISION

We now arrive at the decision point and its associated methodology.

The Vision statement describes command and control systems as a paramount operating commitment to the Air Force.

The operation of this resilient system could very likely be under assault during the run up to an engagement, as the world saw during the run up to the invasion of Georgia by the Russian forces and the run up to diplomatic negotiations with Estonia.

Our peer competitors got to practice with real time integration of cyber and physical forces, and this has been accomplished in joint exercises ever since.

Whether it is a day without space, or communication under duress, it is all a part of the Decide point in the OODA Loop.

To put it in more concrete terms, when one sends two B-2s or two F-22s to the North Korean deterrent fight, what options does the national command authority really have if their bluff is called?

As the Air Force considers itself to be a part of the run up and flow down Decision points, it is incumbent on the Air Force to ensure the integrity of the data flow in both directions.

By extension, there then exists a sharing of this integrity amongst the various agencies that serve as information providers and decision executors.

The Air Force mission to be in Cyber is all about an awareness of this responsibility and the impact of trusted data to its forces, and this will only grow in importance over time.

ACTION

The final element in the OODA Loop is Action.

We have seen the Air Force's role in the Observe, Orient, and Decide elements, but it is in the Action portion that the essence of military force resides.

Sir Winston Churchill has best described our state of affairs as, "The power of an air force is terrific when there is nothing to oppose it."

This has been the state of play in the engagements for the past quarter century, and this has misled key decision makers to consider investment in the air domain as a waste.

Decision makers failed to look to forward and anticipate a future with peer competitors, and instead they decided that sitting on their lead was sufficient in the name of saving resources.

Secretary Robert Gates once said in a speech to the Economic Club in Chicago:

Consider that by 2020, the United States is projected to have nearly 2,500 manned combat aircraft of all kinds.

Of those, nearly 1,100 will be the most advanced fifth generation F-35s and F-22s. China, by contrast, is projected to have no fifth generation aircraft by 2020.

And by 2025, the gap only widens.

The U.S. will have approximately 1,700 of the most advanced fifth generation fighters versus a handful of comparable aircraft for the Chinese.

Nonetheless, some portray this scenario as a dire threat to America's national security.

This projection, although seemingly ominous, turned out to be false in two respects.

First, Chinese and Russian fifth generation fighters were indeed manufactured, and domestic cutbacks started almost immediately prior to the F-35 program.

The potential of a threat to America's security was certainly not yet dire; but one cannot help but wonder if these developments have signaled a drift in priorities.

As General George Kenney was said, "Airpower is like poker. A second-best hand is like none at all — it will cost you dough and win you nothing."

Even Secretary Donley, who while Secretary Gates was in the position wrote a letter supporting Gates' decision to stop producing F-22's has now testified that " The Air Force has stretched the risk we can prudently take and must push now to get the most combat power possible from our forces."

Strategically, "action" is where most armed forces dwell and operate most effectively.

This is also the beauty of the OODA Loop, as it transcends levels of scope and allows each stage to explore uses of the components of its forces.

At the same time, this devolvement may result in independent behavior and what has become 'islands of excellence' or 'stovepipes'.

One of the best examples of this involves the use of geography to establish operational division between ground units.

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In Iraq 2003 for example, the Euphrates River was used by commanders to separate successful campaigns by the Coalition Army and Marine forces.

Each supported one other by protecting the common flank, which was the river itself.

This effort became muddled as progress reports became discordant, and command authorities began to order slow downs and halts- a move that was strikingly similar to Eisenhower's commands of British and American forces in the Second World War.

For these reasons and more yet; it is heartening to see the Air Force Vision statement utilizing terms like integrate, and interoperability, and building relationships.

Actions taken in the rapid fire future engagement will need nearly machine to machine coordination as the weaponry flies farther; and with more devastating effect, and mastering these concepts of integration, interoperability and relationship building will become crucial stepping stones.

Additionally, with our forces diminished by obsolescence and budgetary drawdowns; we must believe our 'first look, first shot, first kill' slogan so as not to waste precious commodities of the future fight that include projectiles, missiles, bullets and cruise missiles.

Credible feedback as the battle progresses may be a difficult commodity, but it is incumbent on the Observe element to continue to provide situation awareness to every level of command.

We must fully integrate the force so that every shooter is a sensor, and some sensors as shooters can provide facts about targets and anti-access platforms that will minimize our own casualties.

The Need for an Attack and Defense Enterprise

In this element of the OODA loop is where the offensive enterprise resides.

This enterprise is composed of all the elements for expeditionary warfare, to include resupply.

The Air Force, in designing its force structure, also serves as the supply element for other services in rapid mobility exercises.

As an example, the tanker force does not only function as a self-servicing agent, but also as an asset for joint and coalition forces.

In the same vein, in this time of reduced resources, the Air Force must look to coalition partners as it has in the past to provide needed firepower and support elements that go beyond airfield support.

When Admiral Mike Mullen was alluded to building a "thousand ship Navy," he envisioned that our coalition partners would be included in our own force element.

Similarly, the Air Force must also count the tankers, C-17s, as well as the complementary fighter elements that may be made available to counter competitor actions. It has become increasingly clear that our governing body will not be able to provide a complete complement of ready forces as we formerly were accustomed.

How this risk is characterized should be left to the word of the active military commanders, but it has been clear that in future operations, a reliance on coalition equipment is paramount.

By 2025, the Air Force should size its offensive capability around the fifth generation force construct. The fourth generation aircraft should be dominantly assigned to the defensive enterprise, chiefly protecting the Homeland and some expeditionary locations.

The vulnerability of large command and control aircraft is well known, but America continues to believe that we will own the skies in the future fight.

This is an unsustainable prediction.

Our aircraft may retain utility as requirements develop and evolve, but one wonders about the allocation of resources between assured victory and the aftermath.

This is the decision that must underscore the future of airpower.

As one fighter pilot put it when asked about the results of 'Cope India' in early 2007, "Thank goodness we competed with degraded capability, because when the competitor discovers they can kick your ass;, they won't stop at their border or yours." Should this occur, thing will be sure to get ugly.

In the case of Space, Cyber and Transportation, funding should not be spared with respect to training and support of the offensive enterprise with respect to national objective support.

Unfortunately, when funding constraints start to where they are trained and support the offensive enterprise or can be shown to become a reality, objectives can become obscured.

Our dominance in Space currently rests in quantity, and this should not be confused with military dominance other than when it is used in support of military operations.

We have not had a conflict involving space assets, but we have seen other nations training to conduct such conflict. The rules for such a conflict are not yet clear, and thus research into resiliency such as fractionated satellites or other survivable mechanics have not been invested.

During this interwar period, such an invention might well turn future tides in battle.

With our forces growing more and more reliant on space capabilities, a ten-year target for truly resilient space should be developed.

Cyber has already seen application in war as demonstrated during the campaign in Georgia.

In this case the national ability to connect was denied in parallel with aggressor action that crossed the border.

Such denial resulted in a successful invasion that persists to this day with hostile troops occupying a part of that nation.

The current cyber war is more economic than military, but it is also so clandestine that attacks and aggressive defense have been masked in the related activity.

There will need to be research on how to ultimately defend or cover our intended activities.

The current concept of mutual assured destruction as adapted to each domain is currently in vogue, but the extension into cyber belies the low barrier to entry, and makes it mandatory to put in place true barriers. That said, tailoring for each service application will continue to dominate current investment.

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Nothing has happened to detract from making Cyber more and more intrinsic into operations and administration, and war logistic and humanitarian activities- especially as commercial applications- become increasingly adaptable.

Adaptability and agility will dominate this domain, thus impacting command and control activities. Investment in training and integration with other force elements will therefore become critical.

Re-Shaping the Technological Advantage

One of the first uses for the OODA Loop was to foster energy maneuverability in fighter design.

This application of physics was at first left to the winners of engagements during World War I and World War II; but Colonel Boyd used it to advocate for the design of the lightweight fighter that became the F-16.

In a famous photo comparison; his theory was played out illustrating the turning radius of the F-4 and the F-16, where it was clear that the F-16 could start out as the hunted and end up quickly as the hunter.

From this illustration, well over 7,000 aircraft have been produced for use by air forces all over the world, and many more for configurations of missiles.

This use of the OODA Loop has clearly resulted in fewer one on one fights, and a greater concentration on force-to-force operational concepts. 'First look, first shot' is the war cry today and not 'Give them the gun'.

During this same period, concepts for anti-access; and counter anti-access became design elements, and conceptions for 5th Generation Fighters came about via the F-117, B-2, F-22, and F-35.

It is safe to say that the ferocity of the anti-access forces appearing in a less than peer competitor during the Vietnam War was a strategic surprise, and it was countered by technological advance and investment.

It is clear that the "Action" part of the OODA loop is highly dependent on whether this technological advance is followed through to a real force advantage.

All of the elements of our current Air Force- whether Space, Cyber, Transport, and our magnificent Airmen who provide at a moments notice- work at a deliberate pace in responding to the national command authority decision to act.

My own doctrine " If you are ever involved in a fair fight; it is the result of poor planning." emphasizes proper action throughout the OODA loop; and entails actions by resource decision makers and department leadership to maintain our strength and resilience in periods of high activity and periods of pause.

Even with the chastisement of Secretary Gates for his prognostication, the words of a former Russian diplomat ring in my mind:

"The future is not understandable, and we do not entertain predictions."

There must be planning that reasonably reflects the desires for maintaining our national sovereignty, and the opportunity to contribute to lasting peace through strength can be achieved by implementing the OODA Loop.

Conclusion: Shaping the Kill Web

Airpower in the 21st Century will be all about maintaining a sufficient deterrent capability to preserve the always-fragile peace.

Airpower provides leverage to our diplomats and it provides credibility to our joint operations.

We spent the better part of the 20th Century identifying and developing the lead technology of stealth and we embedded it into our fifth generation of fighters and bombers.

This progress must be maintained.

The fusion of information transmission between the land, Maritime, and Air Combat components must be a near term goal to leverage every aspect of our forces engaged.

This accelerates the OODA loop by insisting that every shooter be a sensor; and some sensors as shooters as well.

Transmission of information will strain our capabilities, and stress the security element; but with the pace that all discuss in future war; keeping the command authorities abreast of the action will serve all well.

There will be fewer resources available for our military as our assets dwindle and the capability to leverage forces from engaged partners emerge as the key to victory in the future fight.

The recognition by our international partners is clear evidence that this investment was in the right direction, and this investment must continue.

To close; let it be said by our past leaders:

If our air forces are never used, they have achieved their finest goal.

— General Nathan F. Twining

If we maintain our faith in God, love of freedom, and superior global airpower, the future [of the US] looks good.

— General Curtis Lemay

This is the mission and goal of airpower in the 21st Century.

The Deputy Chief of Naval Operations for Warfare Systems Looks at the Way Ahead: Rear Admiral Manazir on Shaping Kill Webs

2016-10-05 By Robbin Laird and Ed Timperlake

Rear Admiral Manazir served until very recently as the Deputy Chief of Naval Operations for Warfare Systems (OPNAV N9) on the staff of the Chief of Naval Operations.

In this capacity, he was responsible for the integration of manpower, training, sustainment, modernization and procurement of the Navy's warfare systems.

At the time we did our interview, Rear Admiral Manazir recently returned from Australia where he was the lead speaker in the Williams Foundation Seminar on new approaches to air-sea integration.

Question: The new Chief of Staff of the USAF, General Goldfein, seems to be focused on issues in ways that the CNO is as well.

For example, General Goldfein focused on the moral imperative of training for the high end fight.

He has highlighted the importance of innovation in C2, including distributed C2.

Second Line of Defense

How do you view the USAF and USN overlap?

Rear Admiral Manazir: The question that drives my response to the challenge is how do we achieve distributed effects across all domains in the battlespace?

We are working closely with General Goldfein through various Service interaction groups; most effectively at the highly classified level.

We talk about issues that are common to our Services on a regular basis.

The core commonality between the two is that both are expeditionary services.

When we get into the battle area, Air Force assets can strike, reset, and strike again.

Naval forces operating in the maritime domain provide persistence.

If you combine Air Force and Naval combat capabilities you have a winning combination.

If you architect the joint force together, you achieve a great effect.

It is clear that C2 (command and control) is changing and along with it the CAOC (Combined Air and Space Operations Center).

The hierarchical CAOC is an artifact of nearly 16 years of ground war where we had complete air superiority; however, as we build the kill web, we need to be able to make decisions much more rapidly.

As such, C2 is ubiquitous across the kill web.

Where is information being processed?

Where is knowledge being gained?

Where is the human in the loop?

Where can core C2 decisions best be made and what will they look like in the fluid battlespace?

The key task is to create decision superiority.

But what is the best way to achieve that in the fluid battlespace we will continue to operate in?

What equipment and what systems allow me to ensure decision superiority?

We are creating a force for distributed fleet operations.

When we say distributed, we mean a fleet that is widely separated geographically capable of extended reach.

Importantly, if we have a network that shares vast amounts of information and creates decision superiority in various places, but then gets severed, we still need to be able to fight independently without those networks.

This requires significant and persistent training with new technologies but also informs us about the types of technologies we need to develop and acquire in the future.

Additionally, we need to have mission orders in place so that our fleet can operate effectively even when networks are disrupted during combat; able to operate in a modular-force approach with decisions being made at the right level of operations for combat success.

Question: When you were in Australia, you highlighted that the Australians and British, who were participating with you in the Williams Foundation Conference, were on the same page with regard to the way ahead.

How important is that for the US Navy and Marine Corps team?

Rear Admiral Manazir: Crucial.

In effect, when we can operate together in this new environment and work from the same page, we can support core allies or allies can support us in the battlespace.

We can function as each other's wingman.

We are moving from a platform-centric mindset to a capability-centric mindset.

For instance, when we talk about the F-35 we are focused not simply on the platform but how that F-35 empowers and fits into the distributed networks or kill webs.

It is the outcome and effect we are focused on.

If we're going to fight next to each other, the force (as an evolving distributed capability) has to understand how to employ their weapons systems, including how to best leverage the F-35, rather than just relying on the pilot that is flying the F-35 understanding what it can do.

Question: There clearly is a challenge between the force and technology moving into a distributed direction and historical legacies of slow moving hierarchical decision making.

How would you describe this challenge?

Rear Admiral Manazir: The rules of engagement (ROE) need to keep up with the technology.

An F-35 is going to have electronic means that can affect somebody a long way away.

We didn't have those electronic means before, and so the ROE should be able to allow us to employ weapons based on the technology that we have.

To keep up with technology is a key point, but it goes all the way back to when the bad guys are successful snipping parts of the network, you need to have mission orders that are effective and I am confident we are training with that in mind.

Question: Recently, you made a speech on directed energy and discussed the way ahead for the US Navy in this very promising area.

What is your perspective?

Rear Admiral Manazir: Any vehicle which can be a source of space, weight, power and cooling, with enough capability to generate and hold the power needed to employ directed energy weapons can be a useful platform for directed energy in the future fight.

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More generally, directed energy weapons are part of our overall transformation in the weapons enterprise. Directed energy weapons are fifth generation weapons. Directed energy weapons, coupled with other new types of weapons, are critical to empowering a distributed force.

We need directed energy weapons as adjuncts to our current kinetic weapon systems in order to turn the cost curve our way. For example, we shoot down cruise missiles that cost a couple hundred thousand dollars with $3 million defensive missiles.

Our weapons are very effective, but we shoot a $3 million round every time we use them.

We are working to build synergy among electronic attack, directed energy and kinetic weapons to shape an interactive and integrated capability for the distributed force.

We are moving towards funding a directed energy plan which would enable us to move towards implementing interim directed energy laser capability between now and 2020.

There's a 30-kilowatt laser on USS PONCE right now.

It's in the Arabian Gulf and it works.

It works very well.

As you know, lasers can be used for communications. They can be used for ISR.

They can obviously be used for non-kinetic effects.

In order to have the higher-end kinetic effect, you have to have the space for the weight of the laser itself, the power for it, and then the cooling-wherever the source.

Obviously, with a ship in the water, you have an unlimited source of cooling water.

Then, in order to have a very, very deep magazine for a laser shot, you either have to have a constant source of fairly high electrical power, or you have to have a very large battery.

We are not waiting until we have what many see as the ultimate goal, a one megawatt laser weapon; we would like to build capability incrementally.

Over time we will be able to field higher and higher power laser weapons.

It is about putting it into the fleet and evolving the capability; it is not about waiting until we have the optimal weapon.

We need not just the weapon, but the training and the tactics shaped by the fleet to provide inputs to how best to integrate the capability into the force.

Question: If we return to the non-platform centric point, this applies to directed energy weapons as well. As you add the tool you adjust the entire fleet to evolving operational capabilities.

How do you view directed energy weapons in this sense?

Rear Admiral Manazir: Directed energy weapons are only a part of this new way of thinking.

The key is continually evolving combinations of capabilities that enhance the defensive and offensive power of the platforms that you put into the kill web.

We are very focused on the evolving man-machine relationship, and the ability of manned and unmanned systems, as well as kinetic and non-kinetic systems, to deliver a broader spectrum of capability to the force.

We are aiming to use the machine for the OO (Observe-Orient) part of the OODA (Observe-Orient-Decide-Act) Loop and optimize our human capabilities to do the DA (decide-act).

Fighter pilots have always been "thinking aviators" but we are adjusting what we expect from them as they become key nodes and crucial enablers in the kill web.

Becoming a Top Gun pilot in this world will be quite different than in the legacy one.

Question: We have written about software upgradeability as a key element for shaping the way ahead for 21st century air systems, such as in the Wedgetail, the P-8, Triton and the F-35.

How do you view the importance of such an approach?

Rear Admiral Manazir: Common software upgradeability is an essential element, especially to be able to alter the web or portions of the web at the speed of technology to be able to outmatch our adversaries in an evolving threat environment.

We are working to shape such a cross-cutting capability throughout the fleet so that we can have interactive modernization, even machine learning and cognitive processes which can be done rapidly and cost effectively.

This can only be done through a software-defined process.

We need to have open systems architecture; truly open systems, where there is middleware that enables the creation of multiple apps to provide innovative responses to evolving threats.

We are learning as we go: Navy Integrated Fire Control-Counter Air (NIFC-CA) is a system of systems approach, which is a huge engineering challenge. Here you have to connect different proprietary systems retroactively.

They were all created under different sets of standards, based on separately developed requirements, with data rights in each commercial company, and so you have to engineer the network that connects these nodes; in this case the NIFC-CA web.

Our goal as we build warfighting systems, is to partner with OPNAV N2N6 (Deputy Chief of Naval Operations for Information Warfare) to build a systems of services approach, which is an app-based approach.

Vice Admiral Jan Tighe and her team are focused on shaping an open architecture standard into our systems; the government defines the standard, and owns the standard, and hands the standard to the firms who then create the systems.

It is crucial to create systems which are built to be "integrateable" from the ground up; and to allow for applications which can be developed for one platform which can then be migrated to another one, as appropriate.

We are moving in that direction.

The Synergy Built Into the Queen Elizabeth Class Carriers and the F-35B

Last Spring, the Williams Foundation held their latest seminar on 5th generation enabled combat. This one focused on new approaches to air-sea integration, and featured two key foreign military perspectives.

The first was provided by Rear Admiral Manazir, who until recently served as the deputy chief of naval operations for warfare systems (OPNAV N9) on the staff of the chief of naval operations. In this capacity, he is responsible for the integration of manpower, training, sustainment, modernization and procurement of the Navy's warfare systems.

His presentation focused on the strategic context for the U.S. and allied maritime forces and shaping a convergent way ahead. How can the allies shape convergent capabilities to ensure that the global commons remain open, and not controlled by powers seeking to enforce their will against the allied powers?

Rear Admiral Manazir highlighted the kill web approach as a way to shape more effective integration of force and convergence of efforts.

The kill chain is a linear concept, which is about connecting assets to deliver fire power; the kill web is about distributed operations and the ability of force packages or task forces to deliver force dominance in an area of interest.

FIGURE 3 US NAVY SUPER HORNETS FLY PAST QUEEN ELIZABETH CARRIER DURING ITS SEA TRIALS. WORKING THE RELATIONSHIPS BETWEEN THE ALL F-35 UK CARRIER AND THE MIXED 4TH-5TH GENERATION AIRCRAFT ONBOARD US CARRIERS IS A KEY PART OF RESHAPING AIRPOWER AT SEA. CREDIT PHOTO: US NAVY

It is about building in integration from the ground up so that forces can work seamlessly together through multiple networks, rather than relying on a single point of failure large network.

The second major presentation by a foreign military leader was by Captain Nick Walker of the Royal Navy, who is on the Naval Staff. Earlier, we interviewed Captain Walker as part of a RN and RAF team discussing the carrier and strike aviation during an interview conducted at Whitehall in the first quarter of 2014.

He was then Commander Nick Walker and serving as the Chief of Staff Carrier Strike in the Carrier Strike and Aviation Division within Navy Command Headquarters in Portsmouth.

During that interview, Captain Walker underscored a key point about the new capability for the national decision makers:

Question: How does this evolving capability affect a possible rethink about the way ahead for the forces?

"Walker: This evolving capability will give the decision maker a lot of flexible tools to respond or prepare for crises.

The Maritime Task Force can be well integrated with land based air but does not need a lot of forward ground presence to generate combat effects.

This can give decision makers significant flexibility with regard to a crisis or to have the ability to move to crises rather than having to generate force build up in a particular place in order to intervene."

Captain Walker certainly picked up on that theme and wove the carrier discussion within a broader emphasis on how it both triggered and reflected the transformation process for the UK power projection forces.

He underscored that both the F-35 and the carrier are being brought into service together, and together they are key definers of the new power projection approach for an information age.

The carrier is being introduced from the ground up as a joint asset; not simply a maritime asset.

"The carrier strike journey is driving significant cultural change in the forces as well."

He started by focusing on the core point that the carrier is coming into service as part of the overall transformation of UK power projection capabilities. Indeed, the CEPP or Carrier Enabled Power Projection statement of intent highlights the way ahead:

"An integrated and sustainable joint capability, interoperable with NATO, that enables the projection of UK Carrier Strike and Littoral Manoeuvre power as well as delivering humanitarian assistance and defence diplomacy, enabling joint effect across the maritime, land and air environments at a time and place of political choosing."

He noted that the role of Special Forces has been highlighted since this original statement and will be folded into the revised statement of intent with regard to the role of the carrier within the UK forces.

CEPP has been maintained within the Ministry of Defence. This is in distinction to most other capabilities, which have been given to the front line commands. This allows joint forces command and the services to focus on CEPP as a joint capability.

The deck of the Queen Elizabeth carrier is 85% of the size (i.e. area) of a Nimitz class carrier; which can carry up to 36 F-35Bs along with a Merlin Crowsnests and a Merlin Mk2 ASW helo. Alternatively, the ship can be used in the projection of land forces from the sea in terms of Marines and helo insertion capabilities as well.

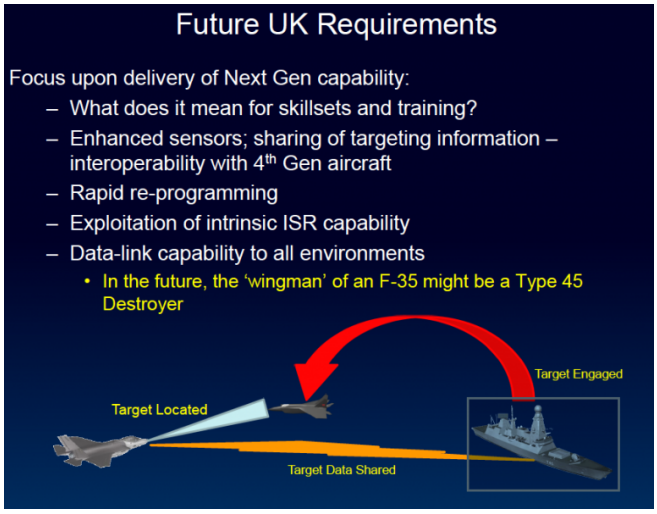

FIGURE 4 SLIDE FROM PRESENTATION BY CAPTAIN WALKER, ROYAL NAVY, AT WILLIAMS FOUNDAITON AIR-SEA INTEGRATION CONFERENCE, AUGUST 10, 2016

But it is the carrier strike focus, which is definitional for the new carrier.

The ship has been designed from the ground up to support F-35B, in terms of weapons, C2, and ISR integration.

"We have also built from the ground up interoperability, and have worked closely with the USN and USMC with regard to this capability. And we are working on a broader approach to NATO interoperability as well."

He provided an overview of the timing of the build out of the ship and the process of marrying it with the movement of the UK F-35Bs being prepared and trained in the United States to its permanent location in the UK at RAF Marham.

The initial carrier IOC is projected to be December 2020 with the fully integrated F-35 and carrier having full operational capability by 2025.

Much like the leadership of the Royal Australian Navy focused on in their presentations at the seminar, Walker emphasized new approaches to task forces as key part of their transformation approach.

Clearly, the UK is looking at the evolving impact of introducing carrier strike upon the overall change in the RAF and Royal Navy as well. And a key aspect of this transformation is working the evolving integration of fifth gen upon legacy capabilities.

Captain Walker highlighted the shift from a legacy mindset, which focused on thinking of maritime versus air environments to an integrated information dominance environment.

"A key cultural change is that we are looking at air and maritime as an integrated domain; and we are looking at the interaction among the environmental seams of our forces driven by a kill web approach and capability."

A clear challenge is reworking C2.

"We need to shape a more mission order vice a directive Air Tasking Order approach to the use of an integrated air-maritime force."

Putting the new carriers in play completely integrated with the F-35 will provide the foundation for shaping the way ahead for the UK power projection forces.

Put bluntly, shaping the way ahead will be defined by the operational experiences entailed in operating and deploying the new carrier strike force and leveraging that capability will be crucial in thinking through future procurement decisions as well.

"We are focused on being more platform agnostic; and ironically, the F-35 can be looked at as a new platform an keep in the old platform-centric approach but we are looking at it as lever of change for next generation thinking and capabilities.

"We are taking the kill web concept very seriously, and examining how best to shape the desired outcome from nodes in the operational force, rather than focusing on specialized platforms.

"How do we generate operational tasks to be delivered from the integrated force?"

"How do we bring the Typhoon which is a key air asset into the kill web?

"Rapid reprogramming of platforms is a crucial way ahead for sure.

"The ability to exploit the intrinsic ISR capability of the force, rather than simply relying on specialized ISR platforms is a key way ahead as well.

"The ability to deliver effect throughout the force with data-link capabilities such as in the future the wingman of an F-35 could well be the Type 45 destroyer"

In short, Captain Walker saw significant commonality in terms of the Australian rethink about the way ahead for their navy and how the UK was thinking about the transformation of its power projection capabilities.

The Way Ahead for the RAAF in the Integrated Defense Force: The Perspective of Air Marshal Leo Davies

2017-08-31 By Robbin Laird

During my recent stay in Australia to attend and write the report for the Williams Foundation seminar on the future of electronic warfare, I had the chance to continue my discussions with Air Marshal Leo Davies, the Chief of Staff of the RAAF.

The RAAF is certainly leading the pack in shaping and crafting a fifth generation air force.

How does the Chief of the RAAF see then the role of the RAAF?

"Our core business is to ensure that we can be a responsible element of whatever coalition the government determines we need to work with to meet Australian interests

"Australia and the Air Force in particular need to be equipped, trained and agile enough to be effective.

"Our core business is to focus on day-to-day management of sovereign Australia territory and interests.

"And that can vary from our contribution to the monitoring of fisheries, or of dealing with people smuggling, or of being aware of what's in the sky above us, and what might be in the sky above us in years to come, is our everyday evolution of a defense force.

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"We can do that better if we understand our neighborhood as well as we understand our own country.

"We have consciously begun to shape a trained workforce and a strategy which prioritizes our international engagement and our relationship with our neighbors,

"We've had strong military-to-military relationships with our neighbors for many decades. And we look to strengthen and improve our effect in this domain."

Figure 5 **On Friday 25 August 2017 a dedicated Last Post service was held at the Australian War Memorial marking the 75th anniversary of the Battle of Milne Bay. The Battle of Milne Bay was an important victory for Allied forces, marking the first time that Japanese forces were defeated on land. A key feature of the battle was the close cooperation between the Australian Army and the RAAF. Hudson bombers from RAAF No.6 Squadron provided reconnaissance and bomber support, No.75 Squadron provided Kittyhawks, and the flying squadrons were supported by No 37 Radar Station and No8 Fire Control Unit during the Battle. Personnel from the Royal Australian Navy (RAN) conducted a naval survey of the bay in Laurabada, which was manned by RAN personnel. RAN warships, including HMAS Arunta, escorted the transport vessels delivering earth moving equipment, food, ammunition, aviation fuel and other essential supplies. The Australian Army deployed its 7th and 18th Infantry Brigades. More than 370 Australians were killed or wounded while the Japanese suffered almost 1500 casualties.**

Question: You are being a more integrated force, but this template, which you are shaping, could then form a solid foundation for the kinds of innovation, which your government might see as important in the years ahead.

What kinds of innovations do you see in the mid term from this perspective?

Air Marshal Davies: Clearly, situational awareness of the air and space domain is critical, but so is an ability to affect an adversary; potentially at long range as part of an integrated package.

"What form this will take is a work in progress and will reflect judgments about need in the period ahead within a coalition context.

"If we shape a force that can only do parts of the warfighting continuum we will have failed.

"That is why in our exercises with partners such as in Talisman Saber 2017 we are working the spectrum of conflict both to shape capability, but to lay a solid foundation for thinking about future operational needs."

Question: As we go forward, it is important to think through the military force we are building up against the objectives, which Australia and its allies can establish within the region and beyond.

You are building a very flexible and in that overused term, agile force, but these tools need to be matched up against objectives.

Clearly, as you have said, protection of Australian territory is crucial but beyond that what approach do we need?

Air Marshal Davies: As you suggest, military capability is a necessary but not sufficient condition for success.

"It is crucial that we sort out objectives among ourselves in the region and beyond,

"What are the most crucial challenges to be met?

"How and where do our approaches overlap and where do they differ?

"And we need to remain aware that the military responses are only one of those options that each respective government has.

"We need to be credible

"And building of credible military options, should they be needed, requires coordination with our allies."

Question: How do you view the fundamentals of the Australian approach going forward?

Air Marshal Davies: A key element is simply our unique geography and the nature of our neighborhood. We have a unique geography, which provides protection as well as challenges within our region.

"As I mentioned earlier, this means shaping robust and clear relationships with our closest neighbors.

"It means working with allies like the US and Japan to shape very flexible military options to adapt to changes in the region.

"Space is becoming increasingly important.

"We have used space largely as a communications domain, but as adversaries adopt new approaches, we need to reconsider how we do business as well.

"And we are adding Tritons and F-35s, which means we can reshape our networks, and access to space will be needed to enable configurable and redundant networks.

"Antarctica will become increasingly important in the period ahead. It is the world's back door and states will look to use transit over the pole to shorten operating distances to areas of interest.

"We want to make sure that we are able to properly defend our ability to maintain Antarctica as a neutral environment."

Question: Integrated air and missile defense is clearly an important coming capability for Australia.

How best to approach that challenge?

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Air Marshal Davies: We have a project, Air 6500, which is designed to get to this capability, and we have tactical pieces relevant to such an effort.

"But we are certainly not there.

"We should be starting with, "How are we going to coordinate air warfare destroyers, space-based communications, F-35, future frigates, Triton and P-8 into an integrated operating picture?

"How do we coordinate all of the command and control, including the civilian air traffic control sensors?

"How do you get them onto the same sheet of music?

"How do you begin to get all the different parts of the national orchestra to play a tune we have not finished writing yet?

"We are working to shape intellectual warriors who allow us to use those disparate elements, and pull them together.

"And without that web, without that integrated air and missile defense, within which we have to plug our allies, or at least make it pluggable, we'll have fallen short.

"That is one of the next big steps for us."

The Network as a Weapon System: The Perspective of Rear Admiral Mayer, Commander Australian Fleet

2016-09-10 By Robbin Laird

During the Williams Foundation seminar on evolving approaches to air-sea integration, Rear Admiral Mayer, the Commander of the Australian Fleet, focused on the concrete and specific challenges facing the evolution of the Royal Australian Navy as a key element of the joint force.

He argued that the Army, Navy and Air forces were evolving in the context of tapping shared networks to empower their platforms to form an extended battlespace.

But the challenge, he observed, was to work through how to most effectively shape, coordinate and execute effects from the networked force while retaining decision authorities at the lowest practical level to achieve speed of decision.

He highlighted that the Navy was returning to a task force concept but one, which was 21st century in character, whereby Navy was tapping into ground and air assets as "part" of the task force, rather than simply focusing on Navy operated assets.

This evolution of the task force effect and the networked approach, clearly in the mode of what the US Navy is referring to as the "kill web," will require the evolution of capabilities, both in terms of connectivity, and training.

During the seminar he characterized the network as a weapon system with "no single master" and that one of the ADFs challenges was to shape the evolving network in order to effectively operate in a distributed multi domain task force.

"Each service is designing its platforms and enabling their potential through the elements of a common network.

"There is increased overlap thereby for the air and sea forces, at the very least through the access and synergy provided in the network.

"A fundamental question presents itself; how should we best develop, certify and deploy our joint network that must be cross domain in nature?"

He argued that the Australian Defence Force was on a good track but needed to enhance its capability to work in a joint domain that recognized tactical effects were generated by Services, but operational outcomes were inherently Joint.

In effect, the Services provided the muscle behind the Joint intent.

If the ADF were to achieve its potential it would need to design forces from the ground up that were interconnected to a single reference standard, rather than simply connecting assets after the fact.

But to do so required an open architecture approach to building a joint network that recognized the different needs of the participants.

The role of the network as a weapon system required that it had to be designed, deployed and certified like any other weapon system.

FIGURE 6 REAR ADMIRAL STUART MAYER, COMMANDER FLEET AUSTRALIA, SPEAKING AT THE WILLIAMS FOUNDAITON SEMINAR ON AIR-SEA INTEGRATION, AUGUST 10, 2016, CANBERRA, AUSTRALIA

I had a chance to sit down with Rear Admiral Mayer and discuss further some of his thinking about the way ahead.

"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."

Second Line of Defense

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.”

Rear Admiral Manazir at the seminar focused on the kill web as a weapon system; it was very clear that Rear Admiral Mayer had in mind a similar thought when he discussed the network as a weapon system.

A key element of change for the Australian Navy was evolving a 21st century concept of task force operations.

He noted that the development of the new amphibious ships had come within a decade of work on shaping an amphibious warfare system.

The importance of the LHDs was not just the capability they offered, but the elevation in thinking they drove in Navy over the decade, thinking that moved operational concepts from the platform to the Task Group and affected all of Navy’s force elements.

He emphasized throughout the interview that not enough work has yet been done to prioritize the evolving C2 and network systems empowering the platforms in the force, including but not limited to the amphibious force.

He sees this area of development as a crucial one in creating a more interactive joint force able to deliver lethal effect.

“The potential of each of the individual platforms in a network is such that we’ve actually got to preset the limits of the fight before we get to it.

“The decisions on what we’ll do, how much we’ll share, and what sovereign rights we will retain have to be preset into each one of the combat systems before you switch it on and join a network.

“There is no point designing a combat system capable of defeating supersonic threats and throttling it with a slow network or cumbersome C2 decision architecture.

“Achieving an effective network topology is so much more complex in a coalition context in which the potential for divergence is higher.

“The paradox is that a coalition network is much more likely a requirement than a national network, and yet what investment we do make is based on national systems first.

“If we don’t achieve the open architecture design that enables the synergy of a networked coalition force, then the effectiveness of the coalition itself will be put at risk.

“The moment we insert excess command and hierarchical decision authority into the loop we will slow down the lethality of the platforms in the network.

“Before we even get in the battlespace we have to agree the decision rights and pre set these decisions into the combat system and network design; the fight for a lethal effect starts at the policy level before we even engage in combat operations.

“The network and C2 rather than the platforms can become the critical vulnerability.”

"This is why the decision making process needs to be designed as much as the network or the platforms.

"If the C2 matrix slows the network, it will dumb down the platform and the capability of the system to deliver a full effect."

"The nature of the force we are shaping is analogous to a biological system in which the elements flourish based on their natural relationship within the environment.

"We have an opportunity to shape both the platforms and the network, but we will only achieve the flourishing eco system we seek if each harmonise with the other, and the overall effectiveness is considered on the health of the ecosystem overall.

"For example, an ASW network will leverage the potential of the individual constituent platforms and that in turn will determine the lethality of the system.

"A discordant network connection will, at least, limit the overall Force level effect of the network and at worst break the network down to discordant elements."

Clearly, a key part of the evolution is about shaping a weapons revolution whereby weapons can operate throughout the battlespace hosted by platforms that are empowered by networks tailored to the battlespace.

And that revolution will have its proper impact only if the network and C2 dynamics discussed by Rear Admiral Mayer unfold in the national and coalition forces.

"The limiting factor now is not our platforms; it's the networks and C2 that hold the potential of those platforms down.

"When the individual platforms actually go into a fight they're part of an interdependent system, the thing that will dumb down the system will be a network that is not tailored to leverage the potential of the elements, or a network that holds decision authority at a level that is a constraint on timely decision making.

"The network will determine the lethality of our combined system."

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.

Second Line of Defense

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.

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.

FIGURE 7 ROYAL NORWEGIAN NAVY AEGIS FRIGATE ROLAD AMUNDSEN F311

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 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.

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.

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.

Second Line of Defense

"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 recent 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.

THE USMC SHAPES ITS WAY AHEAD WITH REGARD TO DISTRIBUTED LETHALITY DELIVERED FROM THE SEA

Shaping the Way Ahead for the Combat Insertion Force: The 15th MEU Goes to Sea with the USS America

2017-01-07 By Robbin Laird

A simple news release highlights the evolving USN-USMC combat team as a key step forward in shaping the combat infrastructure for the sea base, which can support evolving capabilities for the assault force.

According to a press release from the USMC dated January 6, 2017:

The 15th Marine Expeditionary Unit based out of Camp Pendleton, California, assembled as a complete Marine Air-Ground Task Force January 6, to begin pre-deployment training with the U.S. Navy's America Amphibious Ready Group for the upcoming Western Pacific 17-2 deployment.

Joining the 15th MEU Command Element is 1st Battalion, 5th Marines serving as the Ground Combat Element, Marine Medium Tiltrotor Squadron 161 (Reinforced) serving as the Aviation Combat Element, and Combat Logistics Battalion 15 serving as the Logistics Combat Element.

"This Navy-Marine Corps team is comprised of some of the most historic units in Navy and Marine Corps history," said Col. Joseph Clearfield, 15th MEU commanding officer.

"We will honor this lineage by deploying as a strong, flexible, consistent, and responsive crisis response force."

The 15th MEU's training cycle will begin with Marine Corps-specific training and progress to full Navy/Marine Corps joint evolutions throughout the six month pre-deployment period, culminating with a Certification Exercise to test the readiness of the America Amphibious Ready Group and the 15th Marine Expeditionary Unit.

The three ships that will compose the America Amphibious Ready Group are the

USS America (LHA-6), USS San Diego (LPD-22) and USS Pearl Harbor (LSD- 52).

The flagship, USS America, adds a unique aspect to the 15th MEU in that it is the first of its kind to be built with additional air support capabilities, designed specifically to support airborne amphibious assaults.

Commissioned in 2014, USS America will begin her maiden deployment with the 15th MEU and staff of the Commander, Amphibious Squadron 3 embarked.

For its last deployment, while supporting Operation Inherent Resolve; the15th MEU's aviation combat element flew 76 sorties and 500 combat flight hours that resulted in 36 strikes against Da'esh positions, equipment, and personnel. In June, the USS Rushmore and embarked Marines rescued a group of Indonesian sailors from a sinking vessel in the Sulawesi Strait.

The 15th MEU provides a forward deployed, flexible force capable of conducting amphibious operations, crisis response and limited contingency operations in order to support the requirements of geographic combatant commanders.

But what this represents the next phase of the evolution of the long-range assault force and its capabilities by the USS America operating as the flagship for the 15th MEU.

The USS America has recently seen the coming of the F-35 to the ship along with the Osprey and will soon see the CH-53K onboard, significantly increasing its lift capability into the area of interest.

Last month, we discussed this process with Col. Wellons, the CO of MAWTS-1.

Question: How does the integration of the F-35 into your operations, change how you think about those operations?

Col. Wellons: A lot of that can be quickly classified but let me give you an example, which does not fall into that category.

Historically, when we could come off of L class ship with Mv-22s, CH-53s, Cobras and Harriers and we then faced a serious AAA or MANPADS threat we would avoid that objective area.

Now we do not need to do so.

It changes the entire concept of close air support.

Second Line of Defense

In Afghanistan and Iraq we have not had prohibitive interference in our air operations.

With double digit SAMS as part of threat areas we are likely to go, the F-35 allows us to operate in such areas.

Without the presence of the F35, it would be a mission that we wouldn't be capable of executing.

The SA of the airplane is a game changer for us.

Rather than getting input from the Senior Watch Officer on the ground with regard to our broader combat SA, we now have that in our F-35. This allows us to share SA from the pilot flying the airplane and interacting with his sensors. He can share that information, that situational awareness, with everybody from other airborne platforms to the ground force commander in ways that are going to increase our ops tempo and allow us to do things that historically we wouldn't have been able to do.

The ability of the F35 to be able to recognize and identify the types of prohibitive threats that would prevent us from putting in assault support platforms and ground forces is crucial to the way ahead.

The F-35 can not only identify those threats, but also kill them.

And that is now and not some future iteration.

Evolving the capability of the insertion forces rather than simply relying on putting "Walmarts" ashore and conducting combat support from Forward Operating Bases and airbases in contested territory, the sea base provides its own integrated support and operational integrated capabilities.

This force and support integration offshore provides capability for not only force protection but also surprise against enemies who wish to use agility to their advantage. It is not airpower versus boots on the ground. It is about changing the nature of the ground forces used and how air-ground integration to kill the enemy is conducted.

It is not about putting bases on the ground that ISIS can strike as they can.

Forces can be moved around the point of attack to enhance unpredictability while reducing the vulnerability of needed ground forces by relying on insertion forces, leveraging the sea base.

As Ed Timperlake and I wrote in 2014, "*the new capabilities which the amphibious task forces coupled with large deck carriers provides a variable attack force which can insert ground forces against areas of interest and then withdraw back to the sea base.*

ISIS is a rapidly moving target and needs a response that is not measured in the months and years of a return of the US Army to Iraq to re-start training an Iraqi Army which the Obama Administration has already clearly recognized as part of the problem not the solution. The total collapse of the Iraq Army after a decade of US investment is a testimony to failure, regardless of who is at fault in US planning and execution of Iraq Nation Building.

For defenders of COIN, it would have to be explained why time and continued effort would overcome what are clearly deeply rooted fissures within the political texture of Iraq: namely the Sunni-Shite cleavage, the role of Iran and the use of the military by Prime Minister Malki for his own political purposes?

In effect, Maliki has used his Shia-dominated military in ways similar to how Saddam Hussein used his Sunni-dominated military, namely to prop himself up in power and to shape domestic political outcomes to his benefit. Simply changing the name of the leader is not likely to change power realities.

And when the ISIS were able to aggregate forces, the absence of an air enabled ground force, demonstrated a fundamental fact often forgotten: it is not about airpower versus boots on the ground….

If the ISIS forces loses their maneuver ability and their crew-served weapons and armored vehicles, especially tanks, to seize terrain and key choke points, they will be forced back into the cities or be forced hide in small units in the countryside.

If US forces can see them outside of cities they can kill them. City fights should be left to what is remaining of the Iraq Army.

ISIS was well on the way to fielding an Army when the US finally engaged.

Focusing upon what is needed to pulverize military capabilities of ISIS to move rapidly and lethally, can buy some strategic maneuver space to sort out what kind of aid the Kurds might really need to protect their augmented territory within a fragmenting Iraq.

Because the US has the option of leveraging our seabase in conjunction with whatever force capabilities might be shaped to support the Kurds, the US is NOT forced to have agreements with a collapsing regime to influence events. The sea-based force can function as the foundation for a force able to operate without the need for specific territorial agreements on basing with fractious factions of Baghdad.

And when they depart, they do not have to leave their equipment behind which can become later seized by hostile forces and used against the United States and its allies."

http://www.sldinfo.com/prevailing-in-21st-century-conflicts-leveraging-insertion-forces/

Bottom line: what can go in from the Sea with a Navy/Marine AF team can also be withdrawn. Allies to whom we owe a debt can be evacuated or protected from the sea.

These possibilities remain important for our current global commitments and operations. And with the 21st century con-ops provided by the MV-22, the Harrier and then the F-35B, the Marines can engage in providing capabilities for such situations.

Off the shores of San Diego last November a new powerful capability was worked which can augment the insertion force and give it a whole new punch, pack and ability to insert and withdraw force.

The USS America with F-35Bs and Ospreys can provide for force insertion and provide the kind of unpredictability in approach but success in operations, which President-elect Trump has highlighted as a key part of the toolbox to defeat ISIS.

The USS America is the largest amphibious ship ever built by the United States.

The ship has been built at the Huntington Ingalls shipyard in Pascagoula, Mississippi and departed mid-July 2014 for its trip to its initial home part at San Diego, California and then was commissioned in San Francisco in mid-October 2014. It is now undergoing its final trials and preparing to enter the fleet.

The USMC is the only tiltrotar-enabled assault force in the world.

The USS America has been built to facilitate this capability and will be augmented as the F-35B is added to the Ospreys, and helicopters already operating from the ship and as unmanned vehicles become a regular operational element as well.

Second Line of Defense

The Osprey has obviously been a game changer, where today, the basic three ship formation used by the Amphibious Ready Group-Marine Expeditionary Unit can "disaggregate" and operate over a three-ship distributed 1,000-mile operational area. Having the communications and ISR to operate over a greater area, and to have sustainment for a disaggregated fleet is a major challenge facing the future of the USN-USMC team.

FIGURE 8 F-35BS ONBOARD USS AMERICA. CREDIT PHOTO: TODD MILLER

With the coming of the F-35B to the USS America, the tiltrotar-enabled force adds significant capability. This can work a couple of different ways.

The ship can hold more than 20 F-35Bs, but more likely when F-35Bs are being featured would have a 16 F-35B flying with 4 Osprey combinations. The Ospreys would be used to carry fuel and or weapons, so that the F-35B can move to the mission and operate in a distributed base. This is what the Marines refer to as shaping distributed STOVL ops for the F-35B within which a sea base is a key lily pad from which the plane could operate or could move from.

Alternatively, the F-35B could operate as the ISR, C2 and strike asset to work with the rest of the assault force. The beauty of the F-35B for the Marines is that it allows them to operate off of an amphibious ship with a plane which can do C2 or provide forward leaning ISR.

In other words, the F-35 working with an Osprey-enabled insertion force operating off of the USS America could well re-define the meaning of Close Air Support (CAS).

In short, the U.S. has insertion forces able to engage and withdraw, rather than setting up long-term facilities and providing advisers as targets.

The 15th MEU Readies for Deployment with the USS America ARG

2017-03-17 By Todd Miller

Recently Todd Miller of the Second Line of Defense joined the 15th MEU for one of their mission work-ups, specifically "Realistic Urban Training" (RUT). Part II of this series will focus entirely on the RUT.

Covert missions by U.S. Navy SEALs or U.S. Army Delta Force receive significant publicity.

Just the mention of "SEAL Team Six" rings the bell of high respect.

However, there is a US military force of exceptional substance and capability deployed at the forefront of global flashpoints that gets little notoriety.

At any given moment 2 Marine Expeditionary Units (MEUs) numbering around 2200 personnel are mobile and forward deployed around the globe as a crisis response force. The U.S. Navy provides the transportation via the Amphibious Ready Group (ARG).

Though the MEU is the smallest Marine Air Ground Task Force (MAGTF), the units include lethal ground combat, aviation, logistics and command elements.

Second Line of Defense was invited to witness the 15th MEUs (one of 7 MEUs) live fire RUT exercise at Marine Corps Air Ground Combat Center (MCAGCC), Twentynine Palms, CA. Supported by artillery and helicopter assets, the assault force of 100+ Infantryman packed a tremendous punch.

Historically, MEUs realize prominence when responding to humanitarian disasters (such as the Tsunami in the Indian Ocean in 2004) as a force that evacuates Americans from a country that descends into chaos, or perhaps as part of a broader, multi service combat campaign.

That may all be about to change.

In the Pacific, the North Korean ballistic missile threat and China's militarization of the South China Sea may lead to a crisis that calls upon the broad capability of the forward deployed MEU. On the other side of the globe the Iranian situation, Syria, the war on terror (a global issue) all present the strong possibility of a "MEU mobilizing crisis."

Given the Secretary of Defense, James Mattis formerly served in the Marines, he is well acquainted with the capability the MEU/ARG brings to any region.

The capability of the MEU/ARG, combined with its proximity to areas of crisis, position it as the force of choice to initiate, support and or achieve directed objectives.

The combined MEU/ARG is fully capable of a wide variety of missions including (but not limited to);

- *Amphibious assault*
- *Amphibious raid*
- *Maritime interception Operations (MIO)/Visit, board, search, and seizure (VBSS)*
- *Advance force operations*
- *Noncombatant Evacuation Operations (NEO)*
- *Humanitarian assistance (HA)*
- *Stability operations*
- *Tactical Recovery of Aircraft and Personnel (TRAP)*
- *Joint and combined operations*
- *Aviation operations from expeditionary shore-based sites*
- *Theater security cooperation activities*
- *Airfield/port seizure*

Second Line of Defense

While not specifically called out, the mission sets clearly have application to the war on terror. The MEU is all about mobility, speed and impact, and utilizes a Rapid Response Planning Process (R2P2) to respond to a crisis in as little as 6 hours.

This summer, the 15th MEU will deploy with the USS America (LHA-6) ARG.

The USS San Diego (LPD-22) and USS Pearl Harbor (LSD- 52) are also part of the ARG. This is the maiden deployment for the USS America, a new LHA class ship designed specifically to facilitate airborne amphibious assaults.

This first deployment plans use of the AV-8B Harrier II as the combat aircraft, future deployments of the MEU/ARG will begin to utilize the F-35B.

Once the F-35B becomes part of the MEU/ARG, their capability will increase significantly.

The F-35B will identify and destroy high value threats (SAMS), engage in Electronic Attack (EA), Intelligence, Surveillance and Reconnaissance (ISR) and provide command and control (C2).

The F-35Bs stealth and sensors will allow it to operate in contested airspace, significantly broadening the footprint of a MEU.

When seen in combination with the MV-22 Osprey the Marines will be able to operate in contested space up to 450 miles from the ARG, and get there in under 2 hours.

This kind of capability, distributed assault in contested space is a game changer for the MEU/ARG.

Whereas Special Forces and Navy SEALs are by nature engaged in covert activity (get in, achieve mission, get out), the MEU has the size and capability to mount a significant military operation. They are equipped with state of the art weapons systems and extensively trained to their mission sets.

These Marines are fully prepared and capable to enter contested space by force and achieve their assigned objectives.

Their impressive capability aside, one cannot overlook the reality that these Marines are America's sons and daughters. They serve out of love for their country, and the desire to give back. They represent the United States of America as the providers of sustenance after humanitarian disaster, as law and order on the high seas, or as the last act of diplomacy – military force. America has entrusted them with the Nation's most significance needs, and they do America proud.

The Marines are professionals in their craft, from Infantryman to fighter pilot.

While the MEU is deployed on the seas, they participate in exercises with allies and continue to maintain readiness for whatever the hour brings.

The mere presence of the MEU/ARG offshore sends a strong deterrent to any nation inclined to act out of place. Deterrent is the best outcome, to avoid combat all together.

Yes, the MEU/ARG may not get the notoriety they rightly deserve.

However, one would be unwise to let that lack of awareness be cause to overlook their presence.

Based on what I witnessed at the RUT from a small portion of the 15th MEU, if they are called upon to act, I'd not want to be the nail…

The Second Line of Defense expresses its gratitude to; 1st Lt Francheska Soto, Outreach Officer & Sgt Paris Capers, Mass Communication Specialist, I Marine Expeditionary Force (1st MEF); 1st Lt. Maida Zheng, Public Affairs Officer, 15th Marine Expeditionary Unit; the entire 15th MEU; and the trainers and support team at the MCAGCC.

From Red Flag to the Real World: Marine Corps F-35Bs Integrated with USAF Strategic Bombers in Deterrent Deployment

It is difficult to miss the ramping up of tensions caused by North Korean missile launches and nuclear progress.

We have argued for some time that the command structure for US forces in Korea should be given to the USAF for it is an ADA, USAF, and USN capability team which can make a difference.

We are not about to replay 1953.

We have also argued that fifth generation aircraft are not replacement aircraft but part of shaping the way ahead to craft a war winning force for high intensity warfare.

And we have also documented over the past few years, the Marines arriving first in the next round of fifth generation development with their F-35Bs.

We have also argued that the USAF needs to ramp up its buy rate and get on with near term deployments to RAF Lakenheath in Europe and in Japan in the Pacific.

For now, the Marines are providing the key F-35 capabilities.

And the US has deployed F-35Bs with strategic bombers to South Korea.

According to an article by CDR David Bentham, US Pacific Command, in an article published on August 31, 2017:

The United States' newest and most advanced fighter, the U.S. Marine Corps' F-35B Lightning II, joined U.S. Air Force B-1B Lancers for the first time in a sequenced bilateral mission with Japan and Republic of Korea air forces in Northeast Asia August 30.

Two B-1Bs from Andersen Air Force Base, Guam; four U.S. Marine F-35Bs from Marine Corps Air Station Iwakuni, Japan; two Koku Jieitai (Japan Air Self-Defense Force) F-15Js; and four Republic of Korea Air Force (ROKAF) F-15Ks executed this mission to emphasize the combined ironclad commitment to the defense of Allies and the U.S. homeland. Enhancing combined military readiness through integrated missions ensures national leaders of viable and ready military options.

This mission was conducted in direct response to North Korea's intermediate-range ballistic missile launch, which flew directly over northern Japan on August 28 amid rising tension over North Korea's nuclear and ballistic missile development programs.

"North Korea's actions are a threat to our allies, partners and homeland, and their destabilizing actions will be met accordingly," said Gen. Terrence J. O'Shaughnessy, Commander, U.S. Pacific Air Forces, who just returned from an unscheduled visit to Japan to meet with his counterparts. "This complex mission clearly demonstrates our solidarity with our allies and underscores the broadening cooperation to defend against this common regional threat. Our forward-deployed force will be the first to the fight, ready to deliver a lethal response at a moment's notice if our nation calls."

Second Line of Defense

Over the course of the 10-hour mission, the F-35Bs, B-1B bombers and Koku Jieitai fighters flew together over waters near Kyushu, Japan.

The U.S. and ROKAF aircraft then flew across the Korean Peninsula and practiced attack capabilities by releasing live weapons at the Pilsung Range training area before returning to their respective home stations.

"The F-35 embodies our commitment to our allies and contributes to the overall security and stability of the Indo-Asia Pacific region," said Lt. Gen. David H. Berger, commander, U.S. Marine Corps Forces Pacific.

U.S. Pacific Command maintains strategic bomber and fighter capabilities in the Indo-Asia-Pacific theater, retaining the ability to respond to any regional threat at a moment's notice.

http://www.pacom.mil/Media/News/News-Article-View/Article/1295820/us-fifth-generation-fighters-strategic-bombers-conduct-show-of-force-with-allie/

It is hard to show up in a crisis if you are not there.

And the Marines are clearly there with their F-35Bs.

The Marines were first to Red Flag with their F-35s and this engagement has been important in shaping a real world deployment.

It is also important to note all the cross learning going on among the US service F-35 communities and with he allies in shaping an F-35 global enterprise.

This deployment is a force insertion which will lead to enhanced distributed knowledge to the F-35 global enterprise and to the US and allied combat fleets.

Late last year, we went to Yuma to say goodbye to the Green Knights as they were preparing to deploy to Japan.

2017-01-02 By Ed Timperlake and Robbin Laird

We last visited VMF-121 prior it being declared IOC with the F-35B.

That visit was in the Summer of 2014 and we spent time the then XO of the Squadron, Major Summa, now Lt. Col. Summa and the CO of the Beaufort Squadron of F-35s, namely the Warlords of Marine Fighter Attack Training Squadron 501, which we have also visited.

During our most recent visit to MCAS Yuma we had a chance to visit both of the IOC F-35B squadrons in Marine Aircraft Group-13.

We also visited with MAWTS-1 and VMX-1, who have just returned from DT-III testing onboard the USS America.

The first F-35B IOC squadron in the world, VMF-121, the Green Knights, are in the processing of transitioning to their deployment in Japan.

Equipment and personnel are already on the way to Japan and the squadron will fly out this winter across the Northern Pacific to operate from Japan.

The deployment comes at a crucial time, given ongoing developments in the Pacific, and the opportunity to be combat operational with F-22s in Pacific Defense.

The F-35B will continue with this new generation of a V/STOL aircraft to work its flexibility with regard to ships and landing bases, which do not necessarily have to be regular airfields.

FIGURE 9 VMFA-121 CONDUCTS STOVAL OPERATIONS AT USMC AIR STATION ON MAY 3, 2016. VMFA-121 IS NOW LOCATED IN JAPAN AND OPERATES AS KEY ASSET FOR PACOM IN CURRENT OPERATIONS IN ADDITON TO ITS ARG-MEU ROLE.

The flexibility, which the B provides, is an inherent advantage in the Pacific, with its rich tapestry of islands from which to operate to have the unique "F/A/E -35B" integrate into the emerging Kill Webs as expressed by Rear Admiral Manazir.

We had a chance to talk with Lt. Col. Bardo, the CO of the squadron, who is taking the squadron to Japan but will soon thereafter transition from the squadron.

But Bardo has been with the squadron during its IOC and work up with the Marine Corps for its deployment to Japan.

He and his squadron are performing key historical tasks as the cutting edge operational F-35 squadron in the world.

This is an unusual situation for the Marines to find themselves in terms of combat air, but the flexibility of a combat information dominance aircraft fits right in with the evolving concepts of operations of the Marines.

Lt. Col. Bardo underscored the importance of Close Air Support for Marines and the role which the F-35 can play in significantly expanding the scope and nature of close air support.

"CAS is considered doctrinally a function which operates only in a permissive air environment.

We can expand CAS to deal with a much wider range of situations than when we would simply operate in a permissive air environment.

And we can provide greater assurance to Marines as they deploy on the ground that we can deal with a much wider array of pop-up threats than we could do with legacy aircraft."

Lt. Col. Bardo described the path to get to where the squadron was right now as it prepared for its Japanese deployment.

Second Line of Defense

The period since declaring IOC has been a busy and challenging one as the squadron pushed out the boundaries of the operational capabilities of the aircraft and worked with MAGTF to integrate the airplane into the CAS role as well as working with the USAF on the air to air missions as well.

It has been a busy period for Bardo and his squadron but certainly historic as well.

Throughout the squadron has found the core capabilities of the aircraft to be a solid foundation for shaping the way ahead.

As Lt. Col Bardo described the F-35:

"For the pilot, the ability to shift among missions without having to think sequentially about doing so is really a key strength of the aircraft.

The airplane can think CAS and air-to-air at the same time and the pilot can then mix and match as the mission demands rather than having to think through the sequence of going from one mission set to the next."

In broad terms, Lt. Col. Bardo described the progress of the squadron going from its time at 29 Palms working CAS, to working closely with MAWTS-1 on shaping the tactics for the use of the aircraft in support of the MAGTF, to its participation in Red Flag this summer as the F-35 component of the air operations being exercised at Red Flag.

In total, these experiences have been crucial in preparing the squadron for its deployment to Japan.

With regard to 29 Palms, the support to the ground combat element was the focus of attention in Steel Knight 2016, which included operating from Red Beach, an austere combat training facility where the presence of FOD or ground debris is a challenge.

At the exercise we could show Marines that the F-35 is a core asset for expanding the operational environment in which the MAGTF could operate and how we can support the GCE.

We built trust in the infantry in what this revolutionary STOVL asset can bring to the force and to enhance their lethality and survivability as well."

With MAWTS-1, the squadron has worked closely on shaping the tactics and training for the new aircraft.

The MAWTS-1 F-35 instructors have come from VMF-121, and the synergy has been crucial to shaping the way ahead for VMF-121 as it faces its deployment to Japan.

Then this summer, the squadron sent planes to Red Flag and flew in a US-only exercise with the full panoply of USN and USAF aircraft, excluding the F-15s.

There the USMC flew its jets and were part of reshaping of air to air operations associated with the F-35.

Lt. Col. Bardo noted that there were many F-16 National Guard pilots who were there, some of which had flown with the F-22 but had not flown with the F-35.

They soon learned that you did not want to be an adversary but to leverage what the F-35 brought the fight.

As they prepared to the deployment to Japan the CO reflected back on his time with the squadron.

"It has been hard work and we have been at the cutting edge of many things with this new aircraft.

The squadron has met the challenges with hard work, innovation and courage and that is how we are preparing for our first overseas deployment, namely to Japan."

We concluded by reflecting back over the history of the Green Knights who from the beginning brought innovation to the fight in the Pacific.

Historically it is interesting to note that VMF-121 was activated in June 1941 and began flying air ground combat missions in August 1942, with the "Cactus Air Force" on Guadalcanal.

The Green Knights made Marine aviation history with fourteen aces, including the legendary Joe Foss CMH so the F-35 enabled squadron is making its own aviation history.

Recently, the Vietnam generation "Green Knights: visited Yuma. Together with the F-35 generation Green Knights, the Vietnam generation Green Knights celebrated the USMC's 241st birthday on November 19, 2016

Lt. Col. Bardo commented:

"It was amazing for us to meet with and discuss with the Vietnam-era Green Knights.

Although much has changed; much has not.

What I told the squadron with our visitors present: look at our predecessors and that will be you in a few years.

You want to be as proud as they are; to look back at your achievements as being the first F-35 squadron and making aviation history.

You will not focus so much on the hard work we have done over the past two years, but will focus on the achievements.

And learn from them about how to meet the challenges and serve the nation."

BUILDING OUT THE KILL WEB: TRAINING, DEVELOPMENT AND THE CHALLENGE OF INTEGRATION

Recently, *Second Line of Defense* visited the Naval Aviation Warfighting Development Center located at Fallon Naval Air Station. The interviews conducted there provide an important perspective on the how US Navy is approaching training for the carrier air wing side of the kill web.

What is clear is that with the looming possibilities of high intensity warfare, there is a clear sense of urgency with regard to shaping an effective approach to training for the kill web. And in so doing, a key issue, which needs to be addressed, is how to cross-fertilize the training with the development of the evolving aircraft, which are now software upgradeable systems.

At the end of this section, we have included an interview with Air Vice-Marshal (Retired) RAAF John Blackburn who addresses this critical issue and the importance of not letting it fall through the cracks.

NAWDC and Shaping a 21st Century Combat Force: The Perspective of Admiral "HYFI" Harris

2017-08-09 By Robbin Laird and Ed Timperlake

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We first visited Fallon Naval Air Station in 2014 and produced a Special Report on the evolution of Naval Aviation anchored in part by that visit.

http://www.sldinfo.com/the-evolving-future-for-naval-aviation/

As the then head of the training center, Admiral Scott Conn, who will soon become head of N-98 or The Air Warfare Division of OPNAV, commented at the time:

Naval aviation is very interdependent on how we train aircrew and how we resource to those training requirements.

As competing readiness requirements pressurize the flight hour program, a bow wave is created by pushing training qualifications later on in one's aviation career.

Naval aviation is looking at this issue hard, to ensure our future forward deployed leaders will have the requisite knowledge, skills and experience to in fact, lead.

We have returned to Fallon this summer and found the training command in the process of promoting significant change associated with preparation for the evolution of high tempo or high intensity combat operations.

The name of the command has changed in part to reflect the significant shift in direction for training for naval air warfare or really becoming combat development training, rather than training for platform proficiency as a core focus.

The target goal is to shape an integrated distributed force able to dominate at all levels throughout the spectrum of warfare.

Several changes have been already been put in place to facilitate this effort, and more are on the way.

One challenge though is the training word.

This term tends to conjure up learning skill sets on a platform and getting proficient on that platform and the conflict envelope within which that platform will confront peer competitors. The image of TOPGUN comes to mind in which it is aircraft versus aircraft in face offs to drive enhanced proficiency.

TOPGUN is part of NAWDC; not the definer of it.

Although platform proficiency is crucial, it is simply a building block in weaving capabilities for the integrated high-end fight and to do so requires significant change, some of which we saw in the period from our last visit to the latest one.

We had a chance during our visit to meet several times with and to interview the current head of the training command, Admiral "Hyfi" Harris.

This Fall the Admiral will join the Nimitz in operations in the Middle East where strike ops are being conducted currently against ISIS.

http://www.navy.mil/navydata/bios/bio.asp?bioID=993

Since we last visited the training command, the name has changed and that change reflects a broadening of the focus to both infusing the Navy with an evolving aviation approach and integrating the air wing with the broader challenges occurring within the fleet.

It is about preparing for the integrated high-end fight and the Naval Aviation Warfighting Development Center (NAWDC) captures that demand signal.

And with the arrival of software upgradeable aircraft, like Hawkeye and F-35, it will be increasingly important to put the evolving TTPs or Tactics Techniques and Procedures as part of the software code rewriting effort as well.

Prior to June 2015, NAWDC was known as Naval Strike and Air Warfare Center (NSAWC) which was the consolidation of three commands into a single command structure on July 11, 1996. NSAWC was comprised of the Naval Strike Warfare Center (STRIKE "U") based at NAS Fallon since 1984, and two schools from NAS Miramar, the Navy Fighter Weapons School (TOPGUN) and the Carrier Airborne Early Warning Weapons School (TOPDOME).

NAWDC is the Navy's center of excellence for air combat training and tactics development. NAWDC trains naval aviation in advanced Tactics, Techniques and Procedures (TTP) across assigned combat mission areas at the individual, unit, integrated and joint levels, ensuring alignment of the training continuum; to set and enforce combat proficiency standards; to develop, validate, standardize, publish and revise TTPs.

In addition, NAWDC provides subject matter expertise support to strike group commanders, numbered fleet commanders, Navy component commanders and combatant commanders; to lead training and warfighting effectiveness assessments and identify and mitigate gaps across all platforms and staffs for assigned mission areas as the supported WDC; collaborate with other WDCs to ensure cross-platform integration and alignment.

https://www.cnic.navy.mil/regions/cnrsw/installations/nas_fallon/about/nawdc.html

The Admiral emphasized the need to resource fully the training cycle by which he meant having the current operationally ready assets in the hands of the warfighters so that they could from the outset train effectively for deployment on the carrier.

He highlighted that there were two barriers, impeding the ability to get to an optimum training rhythm.

The first might be called readiness shortfalls.

"The Navy's tiered readiness system, necessary in the current fiscal environment, has peaks and valleys in the training cycle.

"So you'll come out of a maintenance phase and you'll be at the low end of your training.

"We need to make sure that as soon as you go into the basic phase, you have every aircraft that you are authorized to have, and every aircraft has every system that it's authorized.

"We want to be able to start the training right away, so that you can build reps and sets over time, versus the peak of coming here, getting reps and sets, and then slowing back down again.

"What we've found lately is that as squadrons are coming through, they're about half a step, half a cycle behind.

"They're not going into Basic Phase with their full kit.

"Therefore, when they go to their Advanced Readiness Program, they're still getting up to speed.

"When they come to Fallon they're still learning some of the things they should have learned in the Advanced Readiness Phase.
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"And then when they go on to their Composite Training Unit Exercise (COMPTUEX) and marry up with the ship and the strike group, they're still learning things that they should have been hard-wiring in Fallon.

"And we're having to pass those gaps, if you will, onto the next piece of the training track.

"Readiness should be thought of as investing, the more you can do earlier, and allow that training to compound, the better of you are in the long run, particularly for the high end fight."

The second challenge is having the most advanced equipment being used in the fleet available to NAWDC.

"If I had my way, we would have E-2D here at Fallon.

"We would have the most current Super Hornet.

"We would have F-35 on the line.

"We already have Growler, and our Growlers are operating with the same systems as the latest coming off of the line.

"And they would have all the systems necessary for our schoolhouse instructors to be out there on the cutting edge of developing tactics.

"And currently we're doing it piecemeal.

"We are playing pickup sticks when we need to shape a more capable operational force with our TTP development here at NAWDC."

And the enhanced integrated training and development is at the heart of preparing the fleet for higher tempo operations.

We discussed this development in two ways.

First, NAWDC is working very closely with the surface warfare training community and the Air Force in shaping a more integrated combat training perspective which needs to become more significant in shaping development as well.

With regard to the surface warfare community, the Admiral emphasized the following:

"We have surface warfare officers here at NAWDC.

"We work closely with the Surface Warfare training community as well in shaping a more integrative and integrated approach as well."

With regard to the USAF and integrative training, the Admiral focused on the Growler training with the USAF.

Figure 10 U.S. Air Force members from the 169th Fighter Wing and South Carolina Air National Guard are deployed to Naval Air Station Fallon, Nevada Fallon to support Naval Carrier Air Wing One with pre-deployment fighter jet training, integrating the F-16's suppression of enemy air defenses (SEAD) capabilities with U.S. Navy fighter pilots. (U.S. Air National Guard photo by Tech. Sgt. Caycee Watson) September 2016

"Our HAVOC team works with the USAF Weapons School in the Weapon School Integration phase which runs about a month.

"If you want to think of it in the college realm, this is a 400-level class.

"And we're seeing the Growler used differently by the Air Force than we would probably use it in the Navy.

"That cross-pollination has been extremely useful for both the services."

Second, the F-35 is a very different type of combat aircraft and it would be good to see pairings of that aircraft with Advanced Hawkeye and the Growler to shape the evolution of information dominance operations, as a very clear outcome of working these advanced platforms together to deliver evolving combat capabilities.

"I would like to have advanced Hawkeyes, F-35s and Growlers all here so that we can work integrated TTPs to shape a more effective way ahead for the operational capability of the fleet."

"I would like to get those type model series weapons and tactics instructors cross-pollinated even more, so that the classes and the courses are integrated more fully than they are now.

"We'll have to find different ways to do that because of the Navy's carrier cycle; we are not resourced to be able to do an air wing and do full Weapons and Tactics Instructor classes at the same time.

"We have to keep those separated. I'd like to move closer to the USAF model, but we don't have that flexibility because of the carrier operational cycle."

One way NAWDC will expand its work on integrated warfare is by being able to use new facilities being built right now that will integrate the platform simulators and allow for integrated training and operational thinking at NAWDC.

"We are building an integrated training facility.

"We're going to have all of our simulators under one building, under one common security environment, so that we can do planning, briefing, execution, and debriefing all under the same security umbrella with the full team.

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"The demand signal is that we all need to work together; and the new buildings are being built to meet that demand signal."

These new facilities will allow for the growth of live virtual constructive training (LVC), although this LVC approach is in its infancy but will become more significant to combat development and training efforts over time.

Integrative and interactive training is a key element of shaping a more capable 21st century combat force.

Figure 11 Warfare tactics instructors (WTI), from left to right, Lt. Cmdr. Mike Dwan, Lt Doug Wilkins, Lt. Lisa Schmidt, Lt Joseph Lewis, Lt Scott Margolis, Lt. Andrew Blanco, Lt Weston Floyd, LT Justin Bolly, Lt. Serg Samardzic, Lt. Rebecca O'Brien, and Lt. Cmdr. Derek Rader pause for a group photo at Naval Air Station (NAS) Fallon, in Nevada. The 11 integrated air and missile defense (IAMD) WTIs participated in a pilot integrated air defense course (IADC) — a joint effort led by the Naval Surface and Mine Warfighting Development Center (SMWDC) and Naval Aviation Warfighting Development Center (NAWDC). IADC will activate in late 2016 and train carrier air wings, carrier strike groups, and air and missile defense commanders in a simulated training environment at NAS Fallon. Several IAMD WTIs will teach and train the inaugural course alongside their aviation counterparts from Navy Weapons Fighter School (TOPGUN).

One element leading to greater success in this effort is a more integrated air and surface warfare community.

As the Admiral put it: "The SWO boss, Admiral Rowden, has been pretty adamant about the benefits of their Warfighting Development Center, the Surface and Mine Warfighting Development Center.

"SMWDC has been, in my mind, going full bore at developing three different kinds of warfare instructors, WTIs.

"They have an ASW/ASUW, so anti-surface and anti-submarine warfare officer.

"They have an IAMD officer and they have an expeditionary warfare officer.

"Admiral Rowden talks about distributed lethality and they are getting there rapidly.

"We are watching young lieutenants share with their bosses in a training environment, specifically during IADC (Integrated Air Defense Course).

"This is probably not the way we want AEGIS set up, or how we want the ship to be thinking in an automated mode.

"We may not previously have wanted to go to that next automated step, but we have to because this threat is going to force us into that logic..

And you're seeing those COs, who were hesitant at first, say, "Now after that run in that event, I get it. I have to think differently."

A second element is building out training ranges in a key area of operations, namely the Pacific.

"We do need to continue, to work beyond Nellis, beyond Yuma, beyond Fallon, we've got to start looking at what could we do in Alaska, how can we make Alaska and the events that we do in Northern Edge, more robust?

"What kind of systems, what kind of sensors, whether it's TCTS or the ability to go back and replay an event up at Alaska.

"Or look at Guam as a graduate-level training area, what could we do in Guam when you've got all those assets that are there from both the Air Force and the Navy.

"How much more could you do in and around Guam?

"What could you do in Australia, with an ally who is very forward-leaning in technology and integrating with the U.S. Navy and the U.S. Air Force, and the way they are integrating their armed forces together?

"Where can you take advantage of those opportunities?

"All while understanding that as you do that, you are practicing or playing in somebody else's backyard, and they are watching what you're doing.

"How do you do that, where you can be watched?

"And what do you have to reserve for places where you're less likely to be watched?

A third key element is working cross platform integration to shape a more effective approach to information dominance.

"How do I use the capabilities in the F-35 to enhance what I get out of that fourth-gen platform?

"And, in ways that you didn't think you were going to do it before.

"Not just by being a bigger, better brother that's going to take care of you on the playground.

"But how do I pass information, what information needs to be passed, and when does it need to be passed?

"When do I have to be that white knight on the charger coming in to rescue you, to get you back on a timeline, and when can I just sit back and play maybe quarterback or coach and just suggest, look here, look there, do this, don't worry about that threat.

"And the integration of how do I use that system and the capabilities in the F-35 with those that are in the Growler, where are they complementary?

"Where are they different, and mutually supportive?

"In the times that we have had the E-2D out here, how can I work all of those things together?"

And the evolution of LVC will play an important part in the combat development training process.

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"LVC affords you that environment where you can do the very high-end warfare in an environment where you are not going to be observed. And you can integrate with your surface counterparts; you can integrate with your Air Force counterparts.

"That linkage is going to be phenomenal. Because now we'll be able to go from F-22s, Air Force F-35, anything else they want to throw in the mix, all the way to AEGIS Baseline 9. And some of those can be live and some can be virtual.

"And we can go execute. I think that's exciting.

Figure 12 FALLON, Nev. (Sept. 3, 2015) F-35C Lightning IIs, attached to the Grim Reapers of Strike Fighter Squadron (VFA) 101, and an F/A-18E/F Super Hornets attached to the Naval Aviation Warfighter Development Center (NAWDC) fly over Naval Air Station Fallon's (NASF) Range Training Complex. VFA 101, based out of Eglin Air Force Base, is conducting an F-35C cross-country visit to NASF. The purpose is to begin integration of F-35C with the Fallon Range Training Complex and work with NAWDC to refine tactics, techniques and procedures (TTP) of F-35C as it integrates into the carrier air wing. (U.S. Navy photo by Lt. Cmdr. Darin Russell/Released)

"When you can have a submarine launch a simulated TLAM that's being tasked to them by a MOC somewhere else, that gets a real-time update from an actual F-35 flying on the range, that is seeing that the target that you thought was at point A has now moved to point B and you go back through the MOC to go through the firing unit to give that TLAM an updated target, that is powerful."

Throughout the interview and in earlier conversations with the Admiral, the evolving man-machine relationship as a foundational element was discussed in several ways.

The CNO has highlighted the importance of enhancing the ability to leverage the man-machine relationships, notably with regard to preparing and executing high tempo and high intensity operations.

Nothing ever fully substitutes for time in the air. Consequently, the evolving ability to meld flight simulator training beyond the traditional emergency procedures or simulating mission flying is now being developed as a dynamic "man-machine" learning process.

The engagement process of content learning essentially is shaping how does a pilot and aircrews react to the speed-of-light dynamic flow of information in combat can be captured by both performance on the "range" and by the procedures followed in the cockpit.

Now those pilot and aircrew specific data points can be put into simulators, thus allowing real time repeat learning on how to be a better and better combat team.

The Admiral stressed it will be an exciting time as the new facilities come on line for both aircrews and commanders to specifically hone combat skills.

Clearly, the leveraging of the new platforms built around this relationship such as the F-35 and P-8 is important, as well as the capability to build out LVC and integrated simulation to train more effectively.

Above all, what the Navy is looking at are ways to shape new capabilities for learning and the ability to leverage machines to get better fidelity for learning.

The Admiral highlighted another aspect of this process when he discussed the need to enhance the ability to customize learning to repeat specific skill sets for warriors rather than having to repeat whole simulated courses.

"We are looking to improve simulated learning for targeted skillsets, and individualized learning over all. And one way you can do that is what they're already seeing in the helicopter simulators, where the helicopter pilot is learning how to hover.

"And the simulator is assisting them as necessary to make the hovering more successful.

"As the pilot gets better, the learning software in the simulator backs out and allows the pilot to continue on their own.

"They get in the simulator the next day, the simulator knows who that person is, knows what they needed the day before, maybe backs that off a little bit to see if they've learned anything. And then brings it back up. So you have the simulator actually assisting with the learning.

"And they're seeing that people are learning to do skills like hovering faster."

The final subject we discussed is the close linkage between Fallon and the operational fleet in terms of developing TTPs on demand from the fleet as the fleet is engaged in operations.

One example was working TTPs for air combat strafing in Afghanistan as a carrier was about to engage in this task.

" For example, we needed the ability in the mountains to do strafing at night because of the proximity of the threat and wanting to have a low threshold for civilian casualties met by using the gun on the Super Hornet and the Hornet.

"Very quickly NAWDC developed a methodology for night strafing, and it was developed, put right back out to the fleet, and executed within months."

Another recent example was reviewing TTPs after the shootdown of a Syrian jet in the Middle East and working through the mission and sorting out any improvements in TTPs, which might need to be developed.

After an extensive review, none were deemed necessary to be made.

"The skillsets that we learned in the Advanced Readiness phase, and in Air Wing Fallon, and in COMPTUEX, were everything that we needed to be able to execute the mission we did in Syria."

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In short, NAWDC is a new type of combat training development command, which will be increasingly integrated with other warfighting development centers in building the warfighter for 21st century combat operations.

But it won't happen without the right kind of investments, the right kind of shift in mindset and getting away from the platform centric mentality.

And its full impact will be seen when TTPs can be key drivers of development, software and shape modernization requirements going forward.

An Introduction to NAWDC: Captain Steinbaugh Provides an Overview

2017-08-14 By Edward Timperlake and Robbin Laird

During our recent visit to Naval Aviation Warfighting Development Center or NAWDC, Captain Leif "Weed" Steinbaugh, Director of Training at NAWDC, provided our first briefing which oriented us to the changes at NAWDC since we last visited Fallon Naval Air Station in 2014.

Notably, the name had changed from Naval Strike and Air Warfare Center (NSAWC) to the Naval Aviation Warfighting Development Center (NAWADC).

This change of name is very significant and represents a culmination of the work of the Top Gun era and the laying the foundation for the integrated Warfighting approach for the distributed fleet, which the US Navy is shaping with the fleet it has and the fleet, which is on the way.

Captain Steinbaugh has a significant background in Electronic Warfare and strike operations as well.

He first flew A-6s, then went to Prowler and then to Growler.

This is his fourth tour at Fallon as well. His first tour was with the strike department, the second he set up the Growler department and the third was in the training department.

Captain Steinbaugh characterized NSAWC as follows:

"The focus was on proficiency with the platform, at the individual level with integration in the final week of Air Wing Fallon.

"TTPs were approached from this perspective.

"Then as now we train the training officers for the Carrier Air Group or CAG."

The name change reflects a strategic shift in the US Navy towards integrated Warfighting and, by definition almost, because integration is crucial to success, to an enhanced focus on the high end fight.

NAWDC was the first of a series of Warfighting development centers which have been stood up and which the Navy is leveraging for the evolution of the integrated Warfighting approach.

There are several Warfighting development centers: for surface and mine warfare, underwater warfare, for information warfare, for expeditionary warfare.

FIGURE 13 THE NAWDC MISSION STATEMENT FROM THE COMMAND BRIEF.

Currently, the closest working relationship between NAWDC and the other Warfighting centers is with the surface Warfighting development center, and with the potential to cross link aviation with the weapons onboard surface ships this lays a solid foundation to go where the technology is evolving as well.

There is a monthly video teleconference among the Warfighting development centers.

" We focus on TTP development and doctrine, on upcoming major exercises and any Commander interest items that the Commanders may have.

"The biggest change with the Warfighting Development Centers is our ability now to integrate with the other communities, and to gain a better understanding of the evolving mission areas."

The culmination of the training process at NAWDC is Air Wing Fallon when the air wing about to go on deployment comes for its final training.

"Their training track, if you will, is to get ready for deployment.

"They will have completed the air wing, will have completed advanced readiness program, which is the program done by platform for each of their type of squadrons. We start where they should be, at what level they should be at, finishing ARP, and then we do a crawl, walk, run.

"The first week, week and a half, we give them the plan, we do everything for them.

"They don't have to do any of the planning.

"They just have to execute.

"Once we see that they can execute, we'll get to the next part where they get more involved in the planning, we tighten the timelines down a little bit on them so it provides some pressure.

"We up the game, if you will, on the threats side of things so things feel a bit more real, and finally the last week is ATP, the advanced training phase, where they are pretty much on a timeline.

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"We may see out on deployment, whoever might be out there at the time and they then execute there.

"The threat is about as high as we can ramp it up to."

Captain Steinbaugh highlighted what the training command is doing now but how the transition implied in the name change was laying the foundation for a way ahead towards more effective fleet integration.

With new buildings being added for simulation and training a new phase will be added.

The Way Ahead for NAWDC: Naval Aviation and Working the Kill Web

017-08-16 By Robbin Laird and Ed Timperlake

During our visit to NAWDC, we had a chance to talk with Captain Enfield, an experienced naval aviator with several tours of duty in Japan and Pete Milham, the NAWDC Technical Director.

We discussed with them the evolution of NAWDC to build out capabilities to work within an expanded battlespace and to drive the process of enhanced integration of the air enabled naval force.

The senior leadership has suggested that the strategic goal of a distributed but integrated force is to be able to operate as a kill web.

The kill chain is a linear concept which is about connecting assets to deliver fire power; the kill web is about distributed operations and the ability of force packages or task forces to deliver force dominance in an area of interest.

It is about building in integration from the ground up so that forces can work seamlessly together through multiple networks, rather than relying on a single point of failure large network.

But the kill web remains a concept if the technology and training do not translate into operational realities.

Most often, the technology is discussed in this context; but the training is crucial to shape a way for naval aviators to operate as animators of an integrated kill web.

"Doogie" is a very experienced combat aviator put his focus squarely on the need for vigilance and diligence to refocus the current acquisition process to always make sure "state-of-the art" technology is rapidly fielded and in the hands of warriors when it really matters.

"We have a very slow acquisition process.

"Other countries do not.

"Other countries are beginning to rival us with their intellectual capability.

"We must leverage ever more effective training for integrated operations and to develop the TPPs that allow us to prevail in combat."

There are a number of tools being put in place to provide for the evolution of more effective integrated operations from the ground up or put another way, to train for operating as a kill web requires a new tool set.

FIGURE 14 FALLON RANGE TRAINING COMPLEX. SLIDE FROM NAWDC COMMAND BRIEF

Fallon is known as the Carrier in the Desert; but as the carrier and its role within the fleet evolve and encompass distributed lethality and the kill web, so must the Carrier in the Desert evolve.

It starts with the addition of two new buildings, which embrace the shift.

One building is to house the integrated air enabled force; the second houses the simulators that drive the process of their integration.

The first building, building P420, will house the integrated training effort.

"The entire building is a SCIF (Sensitized Compartmented Information Facility) at 55,000 square feet.

"We will have offices in there.

'We will have auditoriums.

'We will have classrooms.

'We will have mission-planning rooms.

'And the building will also house the spaces from which we monitor and control missions on the Fallon Range.

"We will be able to do all of our operations at the appropriate classification level for the entire air wing."

The additional new building will house the simulators.

"Building P440, which is 25,000 square feet, will host initially the simulator devices for the integrated training facility.

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"These include F-35, E-2D, Super Hornet, Growler, and Aegis."

But this is a work in progress, as all simulators do not seamlessly connect, although this is a clear requirement going forward.

For example, "there is no MH-60R simulator that connects easily to other simulators."

The software side is important as well as the simulators will be upgraded to the state of the fleet software for each platform and the different software builds resident in the fleet as well can be leveraged for each platform.

The software enablement of the new platforms clearly puts a premium on collocating code writers with operators and TTP writers, but this is a work in progress.

But to get the kind of on the fly kind of integration, which will enhance combat success, this transition needs to be made, executed and then evolved.

The ability to shape the virtual training environment is a key focus of attention and needs to be integrated prior to doing the much more difficult part, namely folding in the live aspect of a training mission.

In short, at NAWDC the team is a key part of shaping the way ahead to forge a maritime force able to operate as a kill web.

Preparing for the High End Fight

2017-08-20 By Ed Timperlake and Robbin Laird

The past decade prioritized the land wars, and the Navy along with the Air Force have provided key elements of support and engagement in the support of the ground forces.

With the growing threat from competitors who would engage in high tempo and higher end operations, the Navy along with the Air Force is focusing more intently on the high-end fight.

For the US Navy, this means in part ensuring the safety, security and performance of the fleet against threats in the maritime domain to enable the fleet to support multi-domain operations.

During our visit to NAWDC, we had a chance to sit down with officers from two elements of NAWDC, which would seem at first blush quite different from one another, but in the evolving high end fight and the return of key concerns for effectiveness in at sea operations, actually are.

We interviewed LT Chris "Cathy" Eckel and LT Alicia "New Girl" Willms from N-8 which is a department focused on rotary wing tactics and employment, LT Kirby "TK" Myers who was wearing Silent Service "Dolphins" from N20, which is a department which focuses on TLAMs and their integration into air operations.

According to the US Navy, N-8 is described as follows:

Navy's Rotary Wing Weapons School is composed of a staff of 25 pilots and aircrewmen who instruct the Seahawk Weapons and Tactics Instructor program; provide tactics instructors to fleet squadrons; maintain and develop the Navy's helicopter tactics doctrine via the SEAWOLF Manual; instruct the Navy's Mountain Flying School; provide high-altitude, mountainous flight experience for sea-going squadrons; and provide academic, ground, flight, and opposing-forces instruction for visiting aircrew during Air Wing Fallon detachments.

According to the US Navy, N-20 is described as follows:

The Tomahawk Landing Attack Missile (TLAM) Department provides direct support to U.S. Fleet Forces Command (USFFC) in the development and standardization of tactics, techniques and procedures for the employment of the Tomahawk weapon system.

In addition, TLAM provides training to the CVW, fleet, and joint commands on TLAM capabilities and strike integration

https://www.cnic.navy.mil/regions/cnrsw/installations/nas_fallon/about/nawdc.html

The role of the rotary wing for the CAG is pretty clear-cut – it is primarily focused on ship defense.

And to do so, the Navy operates two helos, the Romeo and the Sierra to combine between them the sensors and missile payloads necessary to provide for close in and medium range carrier defense.

The dyad is worked with Romeo as the sensor rich aircraft and Sierra the weapons heavy strike asset and the interactions between them are designed to provide seamless ship protection and with the sensors and coms onboard links to other assets, which can provide for ship defense as well.

"Both are H-60 helicopters. But the 60 Romeo is a sensor rich aircraft.

"The Romeo has ESM, RADAR, interrogators, all things that make it a very, very good coordination and reconnaissance type platform.

"In contrast, the Sierra carries guns, equipment, and various missiles to provide the strike punch for the dyad."

"The advantage of the Romeo is that the crew can actually manage the maritime picture, and direct aircraft in different places and different sectors, and provide a significant amount of SA to the strike group, particularly the high value unit like the aircraft carrier.

"The Sierra can do that to a much, much lower extent.

"But the advantage of the Sierra is that it is a significantly lighter helicopter, so there can be a lot more weapons/equipment in the air to be used by one of these platforms.

"The way the helicopters work together now is relatively efficient.

"I would like to have two or three Romeos in the fight, somewhere, with all of their sensors turned on, and providing all that SA, but have several Sierras that have lot of weapons in the air, if I need them."

"The Romeo is a heavier airframe.

"So if I can have one or two helicopters configured for anti-submarine warfare, and then one that is just a sensor platform, I can have multiple Sierras that carry a lot of weapons because they have the extra weight to do that, the extra power to do that.

"Then, I have a lot of assets in the air to direct and coordinate depending on the strike mission."

As the Fire Scout is currently being worked with the S-60 into a composite detachment onboard the LCS, it is anticipated that Fire Scout or a UAS capability will become part of the rotor wing providing for ship defense at some point in the future.

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And as off boarding of weapons strike grows in significance and capability sensors onboard the rotorcraft can be leveraged by other elements of the strike force for the ship defense or perhaps other missions.

With regard to TLAMS, their role has been significant in providing for a land attack capability.

And as a submariner, Lt. Myers is working integration with the CAG as part of the extended reach of the airwing.

Indeed, a key function of TLAMS for the aviation community has been the destruction of enemy capabilities threatening the ability of the air wing to operate in contested environments.

“Tomahawk is a very integral part of strike warfare.

“I need to essentially be the day zero weapon that allows for attack air to dominate the air.

“Before that, we need to get rid of certain things in the way.

“Attack air is not going to be able to fly through certain surface to air missile sites without serious investment.

“My job, I feel, is to protect people.

“I want to set the battle space so that all of the aviators out there can fly safely.”

The current TLAMS are GPS enabled and largely focused on fixed targets but the evolution of the systems onboard the TLAM will allow for greater in flight repositioning and significant improvements against electronic magnetic threats.

The TLAMs and follow on weapons will form a key part of the enhanced capability of the fleet afloat to fit and win conflict at sea.

Put in other terms, TLAMS have been about land operations; now with the shift to higher intensity operations the ability to defeat adversaries at sea is a key part of the way ahead, within which the weapons revolution needs to evolve to provide enhanced capabilities to the fleet to defeat an adversary afloat or using land and air assets to threaten the fleet.

Both officers emphasized the need to build up the inventory of weapons in the arsenal and viewed this as even more important than building new ones.

Building new ones will take time, and although clearly important, the focus on fighting with the fleet you have now prioritizes an inventory build up for the current operating force.

The officers both highlighted as well that as you add new weapons, there is a time lag as well as the crews learn the capabilities and would like to see enhanced training capabilities and accelerated acquisition as well to ensure that new weapons can enter the force more rapidly.

But if presented with a choice between ramping up current weapons or waiting for new ones, the officers clearly weighed in on the former.

The officers discussed being able to support the fleet at sea if needed with the TTP capabilities at NAWDC.

“We have a fly away team.

“And a flyaway kit, so in the event in which they need subject matter experts to go to a CAOC and say, “Hey, what is the way that we can integrate TLAM into this fight?” We’re ready to go to provide that support.”

We concluded by discussing the dynamics of change in providing authorities at sea to deal with the new threat environment.

Notably, in the world of the past decade TLAMS are launched by a very high level of a command authority.

As weapons like TLAMS become important to providing dynamic protection to a fleet at sea, there clearly needs to be authority at sea to use weapons to ensure the security of the fleet.

If you are going to have distributed lethality, you certainly need organic defense to ensure the safety and performance of the engaged fleet.

Admiral Swift, Commander of the Pacific Fleet, and his team were working hard on the rethink on decision-making authorities.

According to Admiral "Hi Fi" Harris: "What authorities should reside where and when? They are driving towards mission command which is crucial to deal with evolving threats."

In short, the refocus on high-end warfare and the probability of confronting an adversary at sea is reflected in the thinking and training at NAWDC.

Air Wing Fallon: The Challenges Facing Pre-deployment Training for the Carrier Air Wing

2017-08-17 By Edward Timperlake and Robbin Laird

When we were last at Fallon in 2014, we had a chance to talk to the officers involved in the last phase of training prior to going to the Carrier, namely what they call Air Wing Fallon. Naval Air Station Fallon is known as the "carrier in the desert" and Air Wing Fallon is the final or pre-deployment phase of training down on the Carrier to the desert as the CAG deploys to the carrier at sea.

During that visit we discussed Air Wing Fallon with CDR (S) Jayson "Plato" Eurick, Air Wing Training Officer, at Naval Strike and Air Warfare Center, Fallon Naval Air Station.

Training is about getting ready for deployment and supporting deployment, which is certainly a broad concept of training.

"We ensure that they (the air wing) get up to speed on all of the information that is currently taking place in theater.

"We don't train Air Wing Fallon for a specific theater or country, we give them a broad brushed training, but we ensure that they get the information that is coming directly back from the guys overseas, in this case, the USS Bush.

"And then we train them."

http://www.sldinfo.com/the-usn-combat-learning-cycle-prepare-an-air-wing-for-deployment-while-supporting-one-deployed/

During this visit we discussed the Air Wing Fallon phase of training with Commander "Humble" Pritchard, Lt. Chris "Reek" Neidemeyer and Lt. Neal "Shaky" Dunn.

The officers represent a cluster of experience with CDR Pritchard having more than 830 "cats and traps," Neidemeyer just back from his first fleet tour and Lt. Dunn just back from deployment with VFA-103 "the Jolly Rogers" based at Naval Air Station Oceana, Virginia.

The responsibility of N-5 which these officers represented is identified as follows by the US Navy.

N5: Responsible for training Naval aviation in advanced Tactics, Techniques and Procedures (TTP) across assigned combat mission areas at the individual, unit, integrated and joint levels, ensuring alignment of the training continuum; to set and enforce combat proficiency standards; to develop, validate, standarize, publish and revise TTPs.

Also provides subject matter expertise support to strike group commanders, numbered fleet commanders, Navy component commanders and combatant commanders; to lead training and warfighting effectiveness assessments and identify and mitigate gaps across all platforms and staffs for assigned mission areas as the supported WDC; and collaborates with other WDCs to ensure cross-platform intergration and alignment.

https://www.cnic.navy.mil/regions/cnrsw/installations/nas_fallon/about/nawdc.html

During our last visit to Fallon, the readiness challenged was highlighted as a growing problem.

This visit to Fallon highlighted the reality of what readiness shortfalls meant.

And the importance of this challenge is heightened as potential adversaries ramp up their capabilities and training time as well.

"You would read about potential adversaries and they're flying 120 hours a year.

"You'd sit there and go that's ridiculous.

"Who survives on 120 hours a year?

"We do that now.

"I don't think anybody trains like us, and I think in a high end fight, they will not be able to keep up with the level of professionalism and the quality of people we've got, but I'm going to assume they can until proven otherwise."

Put in simple terms, the Navy goes through a series of training cycles.

If fully equipped and funded for each phase of the training cycle, then all the training tasks can be accomplished and when the aviator moves to the next phase they do not need to learn tasks which they should have learned earlier.

But because of readiness shortfalls, the catch up in each phase of training has become a regular challenge.

This means that at Air Wing Fallon, some of the skills which should have been learned earlier need to be caught up in the pre-deployment phase of training.

It is obviously important that this challenge be met and rectified.

Air Wing Fallon prepares as the earlier quote indicates the CAG for a variety of settings and scenarios, not just what currently deployed CAGs are facing and doing.

And to do this they involve external assets with which the CAG will operate as well.

For the non-naval aviator, the way to think about is that the CAG works its relationship with organic carriers assets, such as with the strike aircraft, Growlers onboard and Hawkeyes.

This part of the concentrate circle expands as the reach of the air wing is extended by its ability to work with assets external to the carrier.

Air Wing Fallon provides training for working with non-organic assets which will vary in terms of what is available and present at Fallon during Air Wing Fallon training.

But obviously as technology evolves and new platforms being added such as P-8s, Tritons, F-35s, etc. the external reach of the carrier is expanded as well.

“The concern that we have is making sure that the CAG is prepared for all contingencies, which is why we have a wide scope when it comes to what we put them through, and in addition, we’ve incorporated realistic scenarios, so they know how painful the real world is going to be.

“They need to learn to use off board and on board systems.

“They need to learn how to work with the E2 or the AWACS to be able to put the puzzle together to figure out if the ROE is met and staying within the allowable threat level or risk level.”

With the evolution of the threat, training needs to evolve as well.

There clearly is a need to work in a “dark environment” where jamming is a key threat and challenge.

There is a need to leverage the digital battlefield and to change procedures allowing for faster upgrades to the data in the strike force to ensure that stovepiped security arrangements block the combat aviators from having the data they need to prevail in the digitally informed battlespace.

This is a particular challenge onboard the carrier, as the crews need to build their own data and crypto loads.

The coming of the F-35 will accentuate this challenge and will need to be solved to ensure that the CAG gets full value out of an information superiority strike asset.

In short, there is a clear need to align security, data flows and sustainment approaches with the evolving CAG and its ability to work with external assets.

“How we acquire, how we sustain, and how we secure our forces needs to work and be aligned for an integrated, high intensity warfare enabled force.

“This is a key challenge which must be met to prevail in combat”

Second Line of Defense

Expanding the Reach of the Battlefleet: The Evolving Role of the Advanced Hawkeye

2017-08-11 By Robbin Laird and Ed Timperlake

The new variant of the Hawkeye has come to the fleet.

The E-2D IOC'd with VAW-125 in 2014.

And aboard the USS Theodore Roosevelt, they completed a CENTCOM deployment ISO OIR.

Then earlier this year, the E2-DE-2D as it is known arrived in Japan with a flourish to join into the defense of Japan and of the US fleet in Pacific operations.

According to a press release from the Commander of Naval Forces Japan and dated February 2, 2017:

IWAKUNI, Japan (NNS) — Carrier Airborne Early Warning Squadron (VAW) 125 arrived at Marine Corps Air Station (MCAS) Iwakuni, Feb. 2.

The "Tigertails" of VAW-125 are relieving the "Liberty Bells" of VAW-115 as the early-warning squadron of the U.S. Navy's Carrier Air Wing (CVW) 5, supporting the Ronald Reagan (CVN 76) Carrier Strike Group.

"We are excited to join the forward-deployed naval forces at Marine Corps Air Station Iwakuni in the amazing city of Iwakuni," said Cmdr. Daniel Prochazka, VAW-125's commanding officer. "I would like to thank the city for its hospitality and for warmly welcoming us to this incredible place. This is my second time in the forward-deployed naval forces. My fond memories make me personally very thrilled to be back."

VAW-125's arrival also brings enhanced capabilities to the region, as the squadron's five E2-D Advanced Hawkeye aircraft provide substantial upgrades over the E-2C Hawkeye platform. VAW-125 is the U.S. Navy's first operational fleet squadron to utilize the E-2D.

"VAW-125 is the first and most experienced E-2D squadron in the U.S. Navy," Prochazka said. "This aircraft has the most advanced airborne radar in the world, and the people who fix and fly it are the best in the U.S. Navy."

Among the improvements in the E-2D are an all-new electronics suite, enhanced turboprop engines, modernized communications, and upgrade potential for mid-air refueling capabilities.

The U.S. Navy first took delivery of the E-2D July 2010, and began a phased replacement of the venerable E-2C aircraft which has served the fleet since 1973.

Prochazka added the forward deployment of VAW-125 to MCAS Iwakuni is in accordance with the U.S. Navy's strategic vision for rebalance to the Indo-Asia-Pacific region, putting the most advanced and capable units forward in order to support the United States' commitment to the defense of Japan and the security and stability of the region.

"I am proud to bring the E2-D Advanced Hawkeye to Japan and to help strengthen the alliance between our two great nations," he said. "I am confident that our people and equipment will continue to build upon the vital relationship between our two countries."

http://www.navy.mil/submit/display.asp?story_id=98672

But this is just the beginning.

Although identified as a replacement for the "venerable E-2C aircraft" it is more than that.

It is a key element off reshaping how the Navy is working the digital battlespace and evolving its integration with other key assets will expand the reach and capability of the fleet to deal with evolving threats.

Figure 15 Japan (Feb. 2, 2017) Five E2-D Advanced Hawkeye aircrafts, assigned to the Tigertails of Carrier Airborne Early Warning Squadron (VAW) 125, taxi the runway after arriving onboard Marine Corps Air Station Iwakuni. VAW-125 will relieve VAW-115 as the airborne early warning squadron for Carrier Air Wing (CVW) 5 in support of the USS Ronald Reagan (CVN 76) Carrier Strike Group. (U.S. Navy photo by Mass Communication Specialist 1st Class Gabriel S. Weber/Released)

To do so will require pushing the training envelope as the new systems are integrated into a developing and evolving digital battlespace.

As a software upgradeable aircraft, the systems will interact with and evolve with other new assets such as the P-8 and Triton (external to the Carrier Air Wing) and with the F-35C (which will be organic to the CAG.)

We had a chance to discuss the way ahead for the training for the Advanced Hawkeye and its evolving roles as well for the fleet with three members of NAWDC's N6 department, better known as the Carrier Airborne Early Warning Weapons School (CAEWWS).

According to the Navy:

The Carrier Airborne Early Warning Weapons School (CAEWWS) is the E-2 weapon school and responsible for Airborne Tactical Command and Control advanced individual training via the Hawkeye Weapons and Tactics Instructors (HEWTIs) class.

CAEWWS is also responsible for development of community Tactics, Technique and Procedures and provides inputs to the acquisition process in the form of requirements and priorities for research and development (R&D), procurement, and training systems.

CAEWWS works closely to support other warfare development centers and Weapons Schools; such as the Surface and Mine Warfare Development Center's Integrated Air Defense Course (IADC) and Integrated Air and Missile Defense WTI Integration Course (IWIC).

Second Line of Defense

Other functions include support to advanced integrated fleet training by way of WTI augmentation to the N5/STRIKE Department for CVW integrated training detachments; also known as Air Wing Fallon Detachment and support of squadron activities.

https://www.cnic.navy.mil/regions/cnrsw/installations/nas_fallon/about/nawdc.html

The interview also highlighted the evolving working relationship between the surface fleet with NAWDC which is a key feature of setting in motion ways to enhance combat integration within the training and development effort, given the central role which TPPs play in shaping combat capabilities to fight with the fleet you have and the one in the process of change.

The head of CAEWWS is Commander David Dees. Joining him in the interview were LT Cremean, the Maritime Employment subject matter expert and CAEWWS Training Officer and LT Andrew Blanco, who is one of the surface warfare liaison officers and an Integrated Air and Missile Defense WTI.

The mix of personnel reflects how the Navy is working to enhance current capabilities and to put in place the kind of cross-platform multi-dimension warfare domain thinking, which is essential for the evolving fleet.

We started by discussing the workflow of the five man crew onboard the Advanced Hawkeye which is different from Hawkeye in that the co-pilot has greater involvement in the execution of the mission data engagement flow.

“By adding a fourth crew member with the ability to utilize the full tactical system we expanded the ability to execute the mission by moving certain tasks to the cockpit.

“It brings new challenges in tactical crew coordination as the crew is no longer able to reach out and interact with that person next to them in the back of the aircraft.”

Inside the E-2, the pilots are not the mission commanders, for that role resides in the back of the aircraft with the Naval Flight Officers or NFOs.

“The co-pilot may also be dealing with the challenges of flying the aircraft and any aircraft issue that may come up, so he can experience task overload.

“This is why we are carefully developing the tactical contracts the co-pilot has, but with the full work station he does now fully participate in the tactical mission which gives us more capability to manage the crew workload.”

Currently, the Hawkeye is used to support the strike effort off of the carrier.

But as the battlespace is changing so will the Hawkeye role.

A key change is the ability to detect threats in a cluttered battlespace.

Here the training needs to focus on the challenge of target identification in a fluid battlespace.

The advanced Hawkeye has sensors appropriate to the task, but enhanced training efforts with regard to this key task is envisaged.

“Target identification is the hard part.”

The Hawkeye team is a key part of the acquisition engagement payload utility function for the fleet.

And associated with the evolving challenge of target acquisition is shaping an effective decision making cycle as well to deal with threats.

Hawkeye is clearly part of the decision making cycle but the overall evolution of executing this capability against evolving threats is a work in progress.

For example, the Advanced Hawkeye has capabilities which are part of air and cruise missile defense and working through the entire package of dealing with this threat is at the heart of the evolving training regime.

And the new emphasis on distributed lethality means that the role of forward operating assets such as advanced Hawkeye are seeing a reworking of the role of the crews onboard an asset like Hawkeye in the decision making loop.

We clearly saw this happening as well in the P-8-Triton community so that one can note that there is a broader shift of emphasis on mission command within the fleet to sort out how different assets will play which roles in the evolving battlespace.

Admiral Harris noted that the Admiral Swift, Commander of the Pacific Fleet, and his team were working hard on the rethink on decision-making authorities.

According to Admiral "Hyfi" Harris: "What authorities should reside where and when?

"They are driving towards mission command which is crucial to deal with evolving threats."

The E-2D is a software upgradeable aircraft and is a key player in shaping the ISR/C2 capabilities operating from the carrier.

The F-35 coming to the carrier deck also has key radar capabilities, notably built by the same company, Northrop Grumman, and working integration will provide a key opportunity to enhance the capabilities of the CAG in supporting fleet operations.

Clearly, tools like Live Virtual Constructive training will become increasingly more important in training for the extended battlespace and there is a clear need to work integration with live assets today with US and Allied forces in order to lay down a solid foundation for something like LVC.

The team emphasized the need to have the advanced assets at NAWDC to allow for the kind of integrated training, which is clearly necessary.

They would like to see E-2Ds and F-35Cs physically at NAWDC to allow for the kind of hands on experience, which can build, integrated cross platform training essential for the development of the skill sets for dominance in the 21st century battlespace.

One could also add, that the need to build ground floor relationships between code writers and operators needs to include the TTP writers as well.

Hence, a different pattern is emerging whereby training is as much about combat development TTPs as it is about single platform proficiency.

"The problem is right now, we don't have aircraft here to fully develop cross platform integration, because we don't have enough time spent together to figure out the optimal direction to drive that kind of integration."

With regard to a future Hawkeye, the team saw a clear benefit to making the next Hawkeye a jet.

Second Line of Defense

It was not simply a question of range and speed, but ease of maintenance.

"The current plane is a great plane. If the follow-on platform was a jet aircraft tanking will be a lot easier. It will make maintenance a lot easier as well."

HAVOC Works the Electronic Warfare Payload in the Digital Battlespace

2017-08-10 By Robbin Laird and Ed Timperlake

During our recent visit to NAWDC, we had a chance to talk with the leadership of N-10 or HAVOC as it is known at NAWDC.

N10: The US Navy's Airborne Electronic Attack Weapons School, call sign "HAVOC", stood up in 2011 to execute the NAWDC mission as it pertains to Electronic Warfare and the EA-18G Growler. HAVOC is comprised of highly qualified Growler Tactics Instructors, or GTIs, that form the "tactical engine" of the EA-18G community, developing the tactics that get the most out of EA-18G sensors and weapons. HAVOC's mission is also to train Growler Aircrew and Intelligence Officers on those tactics during the Growler Tactics Instructor Course.

The Growler Tactics Instructor Course is a rigorous 12 week syllabus of academic, simulator, and live fly events that earn graduates the Growler Tactics Instructor designation – the highest level of EA-18G tactical qualification that is recognized across Naval Aviation. The Growler brings the most advanced tactical Electronic Warfare capabilities to operational commanders creating a tactical advantage for friendly air, land, and maritime forces by delaying, degrading, denying, or deceiving enemy kill chains.

https://www.cnic.navy.mil/regions/cnrsw/installations/nas_fallon/about/nawdc.html

It is clear that the HAVOC leadership looks at their work as providing key tools for the current fight, including embedding Naval aircrews with ground maneuver elements in our current wars.

However they are also significantly laying the foundation for the con-ops evolution of many the tactics and training for combat employment of high intensity non-kinetic payloads in the digital battlespace.

Significantly in building to the future, they are working their "tron magic" across the joint and coalition force.

During our visit we interviewed LT Scot "Chu-Hi" Chuda, LCDR Stephen "Choda" Skoda, LT Steven Sanchetta and LCDR "Sharkey" McCormick.

The team has significant electronic warfare experience starting with Prowler and has worked with Growler for some time as well.

The first point made by the team was that the Growler is mission dependent.

They emphasized that their role varied by mission but they were seeing an expanded role for the non-kinetic capability.

They are expanding beyond a classic Suppression of Enemy Air Defense or SEAD role to look at other ways to contribute to a broader mission set.

One should look at Growler as providing a non-kinetic payload within the evolving digital battlefield because the non-kinetic payload business is itself expanding as threat change and technology evolves.

"How we integrate will always depend on the different assets available and the different missions."

The second point is that demand signal is going up with regard to the electronic magnetic spectrum threat.

"The electromagnetic spectrum is pervasive and everybody uses it and everybody tries to take advantage of it and we are the sole asset in the DOD that has that as our primary mission to affect the electromagnetic spectrum."

The third is that they work a lot with the joint force.

For example, "we spend last third of our Growler Tactics Instructor (GTI) training course at the USAF Weapons School Integration (WSINT) course at Nellis. In fact, every Red Flag now has a Growler squadron participating."

We asked about the current disposition of Growlers and we were told that there are more than 100 Growlers currently with 4 expeditionary squadrons to support the COCOMs.

The fourth point was about a ramping up of integration work for the high end fight.

HAVOC participates two times a year in the USAF Weapons School WSINT course.

"The USAF brings all the platforms together. Everyone is an expert in their own platform when they start WSINT. But WSINT is about forcing integration into the mindset of participants. They provide a problem set where no single platform can do the job alone, they need to use other platforms to working together and need to synchronize to solve the problem and it's something we don't see anywhere else."

There is a growing demand for electronic magnetic payloads in the digital battlespace is going up and the kind of integration being fostered will shape modernization as the combat fleet goes forward.

"Everybody is going to keep using electronics and advanced electromagnetic spectrum to their advantage in fighting and no one is going to forget about it."

It has been a slow process of rolling out Growler capabilities and clearly there is a need looking forward to accelerate the modernization process to ensure dominance in this important warfighting area.

"We need to be pushing forward towards the next capability whether it be an aircraft or UAV or a system of systems bundled capability. As of right now we are 18 years into a 22-year upgrade project on current capabilities that looking forward to the future needs to happen more quickly to deal with this rapidly evolving warfighting area."

We then addressed the need to modify how the USAF and the USN connect in order to more rapidly train and prepare for high tempo operations.

The team pointed out that it took three months to prepare for the joint training, as security and communication barriers made the process much harder than it would need to be to get the quick on the fly integration for the 21st century digital battlefield.

Put in blunt terms, the enterprise rules and security rules in place for today's "Slo Mo" war clearly are not adequate to preparing for higher tempo ops where the force needs to integrate on the fly to deal with the contested battlespace.

The team next discussed the need to get better integration earlier in the process of introducing new equipment or modernized equipment into the force.

Second Line of Defense

"It is not so much teaching the air crews how to use a particular piece of equipment; it is about learning how to integrate into the fight and to get best value from any upgrade or new piece of equipment. We need to focus more attention on that part of the equation."

As an aside we saw the same technology and combat learning dynamic embedded in the US Navy P-8/Triton community at Navy Jax.

Finally, we discussed a topic which we also discussed with the Hawkeye instructors as well.

Working integration of the digital battlespace among Growler, F-35 and Hawkeye would enhance the TTPs, which could be developed to more rapidly evolve capabilities in the digital battlespace.

"There are many of us around here who think that the concept of the E2D the F35 and the Growler integrating would accelerate our transition to where warfare is going with regard to the contested battlespace.

"There are many of us around here who think that would be an outstanding idea that we should really push for and should be a focus of testing and evaluation.

"But there will be people around as well who will say but how does that lead to me dropping bombs?"

Visiting NAWDC: A Discussion with TOPGUN

2017-09-01 During our recent visit to NAWDC we had a chance to talk with the N7 Department, otherwise known as TOPGUN.

The lead for the discussion was the Department Head, Commander Mariner.

According to the US Navy, the role of N7 within NAWDC is as follows:

In the early stages of the Vietnam War, the tactical performance of Navy fighter aircraft against seemingly technologically inferior adversaries, the North Vietnamese MiG-17, MiG-19, and MiG-21, fell far short of expectations and caused significant concern among national leadership.

Based on an unacceptable ratio of combat losses, in 1967, ADM Tom Moorer, Chief of Naval Operations, commissioned an in-depth examination of the process by which air-to-air missile systems were acquired and employed. Among the multitude of findings within this report was the critical need for an advanced fighter weapons school, designed to train aircrew in all aspects of aerial combat including the capabilities and limitations of Navy aircraft and weapon systems, along with those of the expected threat.

In 1969, the United States Navy Fighter Weapons School (TOPGUN) was established to develop and implement a course of graduate-level instruction in aerial combat. Today, TOPGUN continues to provide advanced tactics training for FA-18A-F aircrew in the Navy and Marine Corps through the execution of the Strike Fighter Tactics Instructor (SFTI) Course. TOPGUN is the most demanding air combat syllabus found anywhere in the world. The SFTI Course ultimately produces graduate-level strike fighter tacticians, adversary instructors, and Air Intercept Controllers (AIC) who go on to fill the critical assignment of Training Officer in fleet units.

https://www.cnic.navy.mil/regions/cnrsw/installations/nas_fallon/about/nawdc.html

The role of the squadron pilots is a key element driving change in any air-enabled combat force.

As Ed Timperlake, a former Naval Aviator, who was honored to engage with the first CO of TOPGUN the late "Mugs" McKeown on a worldwide assessment of tactical aviation for the CIA at the height of the Cold war, has argued:

The skillfulness and success of fighter pilots in aerial combat is an extensively researched yet modestly understood and fundamentally complex concept.

Innumerable physical and psychological factors along with chance opportunities affect a pilot's facility for success in air combat.

Perhaps the best narrative of the intangibles of the skill and courage of a fighter pilot was captured by the author Tom Wolfe in his seminal work The Right Stuff.

From the first day a perspective fighter pilot begins their personal journey to become a valuated and respected member of an elite community, serving as an operational squadron pilot, the physical danger is real.

But so is the most significant force for being the absolute best that a fighter pilot can feel which is day in and day out peer pressure by those they really and truly respect, their squadron mates.

http://www.sldinfo.com/squadron-fighter-pilots-the-unstoppable-force-of-innovation-for-5th-generation-enabled-concepts-of-operations/

In our discussion with the TOPGUN team they emphasized that the pilots came from the fleet, and while at TOPGUN, they honed their skills in the aircraft and helped to develop future TTPs against emerging threats.

"We are looking to make the squadron pilot more capable in real world operations."

"We have been working integration with the F-35 for some time.

"The advantage of the TOPGUN pilot is that we have wrung out the capability of the Super Hornet and have brought that knowledge to integration with the F-35.

"We look for how each platform can enable the other to maximize lethality and survivability for the fleet."

The Challenge of Training And Shaping Development: In a Software Development Platform World

By Robbin Laird

August 28, 2017

The Australian Defence Force has set a tough bar for itself – shaping an integrated force and crafting an ability to design such a force.

This is a tough bar but one which they are trying to energize in part by leveraging their new platforms to shape a way ahead beyond the classic after-market integration strategy.

But how best to do this with regard to training and development of the force?

And how to maximize the combat effectiveness to be achieved rather than simply connecting platforms without a significant combat effect?

When we visited Fallon this year, we were impressed that the training command is adding new buildings which are designed to shape greater capability to get the various platform training efforts much better connected.

Second Line of Defense

Fallon is known as the Carrier in the Desert; but as the carrier and its role within the fleet evolve and encompass distributed lethality and the kill web, so must the Carrier in the Desert evolve.

It starts with the addition of two new buildings, which embrace the shift.

One building is to house the integrated air enabled force; the second houses the simulators that drive the process of their integration.

The first building, building P420, will house the integrated training effort.

"The entire building is a SCIF (Sensitized Compartmented Information Facility) at 55,000 square feet.

"We will have offices in there.

'We will have auditoriums.

'We will have classrooms.

'We will have mission-planning rooms.

'And the building will also house the spaces from which we monitor and control missions on the Fallon Range.

"We will be able to do all of our operations at the appropriate classification level for the entire air wing."

The additional new building will house the simulators.

"Building P440, which is 25,000 square feet, will host initially the simulator devices for the integrated training facility.

"These include F-35, E-2D, Super Hornet, Growler, and Aegis."

We were also interested in the clear desire to shape Training, Tactics, and Procedures (TTPs) cross platforms where possible.

The F-35 coming to the carrier deck also has key radar capabilities, notably built by the same company, Northrop Grumman, and working integration will provide a key opportunity to enhance the capabilities of the CAG in supporting fleet operations.

Clearly, tools like Live Virtual Constructive training will become increasingly more important in training for the extended battlespace and there is a clear need to work integration with live assets today with US and Allied forces in order to lay down a solid foundation for something like LVC.

The team emphasized the need to have the advanced assets at NAWDC to allow for the kind of integrated training, which is clearly necessary.

They would like to see E-2Ds and F-35Cs physically at NAWDC to allow for the kind of hands on experience, which can build, integrated cross platform training essential for the development of the skill sets for dominance in the 21st century battlespace…

Hence, a different pattern is emerging whereby training is as much about combat development TTPs as it is about single platform proficiency.

"The problem is right now, we don't have aircraft here to fully develop cross platform integration, because we don't have enough time spent together to figure out the optimal direction to drive that kind of integration."

But what is missing is a capability to connect training, notably cross platform training with software code rewriting of the sort, which the new software upgradeable platforms like F-35 clearly can allow.

Indeed, we added to the above article the following:

One could also add, that the need to build ground floor relationships between code writers and operators needs to include the TTP writers as well.

During my visit to Canberra, I had a chance to discuss with Air Vice-Marshal (Retired) John Blackburn how the training approach could be expanded to encompass and guide development.

"We know that we need to have an integrated force, because of the complexity of the threat environment will will face in the future.

"The legacy approach is to buy bespoke pieces of equipment, and then use defined data links to connect them and to get as much integration as we can AFTER we have bought the separate pieces of equipment.

"This is after-market integration, and can take us only so far."

"This will not give us the level of capability that we need against the complex threat environment we will face.

"How do we design and build in integration?

"This is a real challenge, for no one has done so to date?"

Laird: And the integration you are talking about is not just within the ADF but also with core allies, notably the United States forces.

And we could emphasize that integration is necessary given the need to design a force that can go up an adversary's military choke points, disrupt them, have the ability to understand the impact and continue on the attack.

This requires an ability to put force packages up against a threat, prosecute, learn and continue to put the pressure on.

Put bluntly, this is pushing SA to the point of attack, combat learning within the operation at the critical nodes of attack and defense and rapidly reorganizing to keep up the speed and lethality of attack.

To achieve such goals, clearly requires force package integration and strategic direction across the combat force.

How best to move down this path?

Blackburn: We have to think more imaginatively when we design our force.

"A key way to do this is to move from a headquarters set requirements process by platform, to driving development by demonstration.

"How do you get the operators to drive the integration developmental piece?

"The operational experience of the Wedgetail crews with F-22 pilots has highlighted ways the two platforms might evolve to deliver significantly greater joint effect.

"But we need to build from their reworking of TTPs to shape development requirements so to speak.

Second Line of Defense

"We need to develop to an operational outcome; not stay in the world of slow motion requirements development platform by platform.

Laird: Our visit to Fallon highlighted the crucial need to link joint TTP development with training and hopefully beyond that to inform the joint integration piece.

How best to do that from your point of view?

Blackburn: Defence is procuring a Live/Virtual/Constructive (LVC) training capability. But the approach is reported to be narrowly focused on training.

"We need to expand the aperture and include development and demonstration within the LVC world.

"We could use LVC to have the engineers and operators who are building the next generation of systems in a series of laboratories, participate in real-world exercises.

"Let's bring the developmental systems along, and plug it into the real-world exercise, but without interfering with it.

"With engagement by developers in a distributed laboratory model through LVC, we could be exploring and testing ideas for a project, during development.

"We would not have to wait until a capability has reached an 'initial' or 'full operating' capability level; we could learn a lot along the development by such an approach that involves the operators in the field.

"The target event would be a major classified exercise.

"We could be testing integration in the real-world exercise and concurrently in the labs that are developing the next generation of "integrated" systems.

"That, to my mind, is an integrated way of using LVC to help demonstrate, and develop the integrated force.

"We could accelerate development coming into the operational force and eliminating the classic requirements setting approach.

"We need to set aside some aspects of the traditional acquisition approach in favor of an integrated development approach which would accelerate the realisation of integrated capabilities in the operational force"

SHAPING MANNED-UNMANNED INTEGRATION GOING FORWARD FOR NAVAL AVIATION

The Arrival of a Maritime-Domain Awareness Strike Capability: The Impact of the P-8/Triton Dyad

On May 23 and 24, 2016, during a Jacksonville Naval Air Station visit, we spent time with the P-8 and Triton community which is shaping a common culture guiding the transformation of the ASW and ISR side of Naval Air. The acquisition term for the effort is a "family of systems" whereby the P-3 is being "replaced" by the P-8 and the Triton Remotely Piloted Aircraft.

But clearly the combined capability is a replacement of the P-3 in only one sense – executing the anti-submarine warfare function. But the additional ISR and C2 enterprise being put in place to operate the combined P-8 and Triton capability is a much broader capability than the classic P-3. Much like the Osprey transformed the USMC prior to flying the F-35, the P-8/Triton team is doing the same for the US Navy prior to incorporating the F-35 within the carrier air wing.

In addition to the Wing Commander and his Deputy Commander, who were vey generous with their time and sharing of important insights, we had the opportunity to interviews with various members of the VP-16 P-8 squadron from CO and XO to Pilots, NFOs and Air Crew members, along with the wing weapons and training officer, the Triton FIT team, and key members of the Integrated Training Center. Those interviews will be published over the next few weeks.

The P-8/Triton capability is part of what we have described as 21st century air combat systems: software upgradeable, fleet deployed, currently with a multinational coalition emerging peer partnership. Already the Indians, the Aussies and the British are or will be flying the P-8s and all are in discussions to build commonality from the stand-up of the P-8 Forward.

Software upgradeability provides for a lifetime of combat learning to be reflected in the rewriting of the software code and continually modernizing existing combat systems, while adding new capabilities over the operational life of the aircraft. Over time, fleet knowledge will allow the US Navy and its partners to understand how best to maintain and support the aircraft while operating the missions effectively in support of global operations.

Reflecting on the visit there are five key takeaways from our discussions with Navy Jax.

A key point is how the USN is approaching the P-8/Triton combat partnership, which is the integration of manned, and unmanned systems, or what are now commonly called "remotes". The Navy looked at the USAF experience and intentionally decided to not build a the Triton "remote" operational combat team that is stovepiped away from their P-8 Squadrons.

The team at Navy Jax is building a common Maritime Domain Awareness and Maritime Combat Culture and treats the platforms as partner applications of the evolving combat theory. The partnership is both technology synergistic and also aircrew moving between the Triton and P-8

The P-8 pilot and mission crews, after deploying with the fleet globally can volunteer to do shore duty flying Tritons. The number of personnel to fly initially the Tritons is more than 500 navy personnel so this is hardly an unmanned aircraft. Hence, inside a technological family of systems there is also an interchangeable family of combat crews.

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With the P-8 crews operating at different altitudes from the Triton, around 50K, and having operational experience with each platform, they will be able to gain mastery of both a wide scale ocean ISR and focused ASW in direct partnership with the surface navy from Carrier Strike Groups, ARG/MEUs to independent operations for both undersea and sea surface rather than simply mastering a single platform.

This is a visionary foundation for the evolution of the software upgradeable platforms they are flying as well as responding to technological advances to work the proper balance by manned crews and remotes.

The second key point is that the Commanders of both P-8 aviator and the soon to be operational Triton community understand that for transformation to occur the surface fleet has to understand what they can do. This dynamic "cross-deck" actually air to ship exchange can totally reshape surface fleet operations. To accelerate this process, officers from the P-8 community are right now being assigned to surface ships to rework their joint concepts of operations.

Exercises are now in demonstration and operational con-ops to explain and real world demonstrate what the capabilities this new and exciting aspect of Naval Air can bring to the fleet. One example was a recent exercise with an ARG-MEU where the P-8 recently exercised with the amphibious fleet off of the Virginia Capes.

FIGURE 16 TRITON AT PAX RIVER. PHOTO BY TODD MILLER, 2016.

The third key point is that the software upgradeability aspect of the airplane has driven a very strong partnership with industry to be able to have an open-ended approach to modernization. On the aircraft maintenance and supply elements of having successful mission ready aircraft it is an important and focused work in progress both inside the Navy (including Supply Corps) and continuing an important relationship with industry, especially at the Tech Rep Squadron/Wing level.

The fourth point is how important P-8 and Triton software upgradeability is, including concurrent modification to trainer/simulators and rigorous quality assurance for the fidelity of the information in shaping the future of the enterprise. 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. 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.

The fifth point is about weaponization and its impact. We have focused for years on the need for a weapons revolution since the U.S. forces, and as core allies are building common platforms with the growth potential to operate new weapons as they come on line. The P-8 is flying with a weapon load out from the past, but as we move forward, the ability of the P-8 to manage off board weapons or organic weapons will be enabled.

For example, there is no reason a high speed cruise or hypersonic missile on the hard points of the P-8 could not be loaded and able to strike a significant enemy combat asset at great distance and speed. We can look forward to the day when P-8s crews will receive a Navy Cross for sinking a significant enemy surface combatant.

In short, the P-8/Triton is at the cutting edge of naval air transformation within the entire maritime combat enterprise. And the US Navy is not doing this alone, as core allies are part of the transformation from the ground up.

For our special report on our visit to Jax/Navy, see the following:

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

Shaping a Manned-Unmanned ISR/Strike Capability at Sea: The Case of the Fire Scout and the MH-60S

2017-07-23 By Robbin Laird

A key element of evolving naval power is the ability to integrate unmanned with manned assets aboard the sea base.

This is not only a work in progress, but a capability which will evolve over time with the technology, the operational experience and the ability to leverage the shift in culture which this integration brings to the fleet.

With the framing of the distributed lethality and kill web concepts, the US Navy and Marine Corps team are focused on distributing and dynamically integrating C2 with ISR with strike capabilities.

The very nature of distributed warfare means that the shift is from looking at a ship simply from the standpoint of what organically is on that ship, to how that ship contributes to the battle fleet by contributing assets to that fleet.

We have looked earlier at two key examples of how the US Navy and Marine Corps are working manned and unmanned integration.

The first is the shaping of a new maritime domain awareness strike enterprise built around synergy between the P-8 and the Triton.

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With regard to Triton and P-8, the US Navy will operate them as a dyad. The USN is approaching the P-8/Triton combat partnership, which is the integration of manned, and unmanned systems, or what are now commonly called "remotes".

The Navy looked at the USAF experience and intentionally decided to not build a Triton "remote" operational combat team that is stovepiped away from their P-8 Squadrons.

The teams at Navy Jax and Pax River are building a common Maritime Domain Awareness and Maritime Combat Culture and treats the platforms as partner applications of the evolving combat theory. The partnership is both technology synergistic and also aircrew moving between the Triton and P-8.

The P-8 pilot and mission crews, after deploying with the fleet globally can be assigned significant shore duty flying Tritons. The number of personnel to fly initially the Tritons is more than 500 navy personnel so this is hardly an unmanned aircraft. Hence, inside a technological family of systems there is also an interchangeable family of combat crews.

These new systems are all software upgradeable which sets in motion the opportunity and a need to shape new acquisition approaches to take advantage of software, which can evolve to deal with the threat environment as well.

Software upgradeability provides for a lifetime of combat learning to be reflected in the rewriting of the software code and continually modernizing existing combat systems, while adding new capabilities over the operational life of the aircraft.

Over time, fleet knowledge will allow the US Navy and its partners to understand how best to maintain and support the aircraft while operating the missions effectively in support of global operations.

The second example is being played our right now at sea with the first deployment of the USS America.

The Marines have deployed the Blackjack UAV at sea and are working its integration with manned assets operating within the Amphibious Task Force.

The Blackjack is deployed from a San Antonio class LPD but it launches from that platform but contributes to the entire situational awareness of the task force.

And a third example is the work the US Navy has done onboard the LCS with regard to integrating the Fire Scout UAV with the MH-60S manned system.

The entire approach is to shape an operational experience with the two systems working together and then to build forward from that experience.

Ideally, any future acquisition of new systems would build from this operational experience and inform the evolution of fleet capability.

Although the LCS is currently the only ship in the US Navy set up to support integrated Fire Scout/MH-60S operations, obviously this integration can be applied to current or future fleet assets, such as the new frigate.

And the integration effort, which is a work in progress, is part of the overall effort to distribute ISR, C2 and strike and to off board sensors and strike elements.

Earlier this year, the dyad worked together for the Fire Scout to provide targeting data to an MH-60S to then launch a Hellfire missile.

In an article by Lieutenant Michael DiDonato HSC-23 Public Affairs published on May 15, 2017, this effort was described as follows:

SAN CLEMENTE ISLAND, Calif. (NNS) — The "Wildcards" of Helicopter Sea Combat Squadron (HSC) 23 made history this month, operating MQ-8B Fire Scout Unmanned Air Vehicles (UAV) from Naval Auxiliary Landing Field (NALF) San Clemente Island utilizing a Mobile Mission Control Station (MMCS).

Teams of pilots, aircrewmen, maintenance personnel and civilian specialists functioned organically to complete integrated missions with various surface and air assets.

The two-week operation culminated with the successful employment of the Fire Scout as the laser designating platform for an AGM-114N Hellfire missile, fired from an MH-60S Knighthawk attached to HSC-23 Detachment 2 on board America-class amphibious assault ship USS America (LHA 6).

Additionally, the team accomplished the first ever long-range transit of the Fire Scout by an operational squadron, executing a "control station handoff" while transiting between NALF San Clemente Island and Naval Base Ventura County (NBVC) Pt. Mugu. This operation has paved the way for the future development of the Fire Scout program, functioning as a force multiplier for the larger naval surface community and the tactical application of integrated manned and unmanned platforms in Naval Aviation.

Personnel from HSC-23 began operations from NALF San Clemente Island on May 3.

Prior to this detachment, Fire Scout operators conducted all flight training at NBVC Pt. Mugu, which is approximately 175 miles northwest of San Diego. Bringing the system to NALF San Clemente Island, which is located 80 miles west of San Diego, afforded many opportunities for integrated training with naval assets due to the multitude of ranges and support facilities around the island. The detachment planned and coordinated events despite an array of logistical hurdles, and established procedures for unmanned air vehicle operations within San Clemente Island airspace.

"A primary goal for this detachment was to showcase the capabilities of the MQ-8B," said Lt. Cmdr. David Barnhill, officer-in-charge of the detachment. "San Clemente Island broadens the training opportunities for our Fire Scout team and gives us the ability to work with a multitude of assets not otherwise available."

After completing unit-level training and confidence testing of the Fire Scout system within local and special use airspace during the first week, Fire Scout crewmembers flew range clearance missions and a successful Hellfire missile event in support of USS America Amphibious Ready Group (ARG) on May 10.

"The Hellfire shot was absolutely a highlight for this detachment. It proved that Fire Scout is a viable asset to an already potent team," continued Barnhill. "But more than that, executing a successful in-flight transfer of the MQ-8B from one air vehicle operator to another over 70 miles away was the biggest milestone. It gives us enormous operational flexibility going forward to work with fleet elements on a regular basis."

This detachment can be classified as a resounding success by bringing UAV operations to the fleet on a larger scale than ever before. The Fire Scout provides critical mission sets to enhance battlespace awareness as well as providing early warning detection and classification capability. HSC-23 is at the forefront of MQ-8B Fire Scout operations, driving the development and refinement of manned/unmanned tactics and providing a clear path for the future of Fire Scout operators.

HSC-23 "Wildcards" are a Coronado-based expeditionary squadron under Commander, Helicopter Sea Combat Wing Pacific. It is the first squadron to deploy a MH-60S and MQ-8B composite detachment aboard an Independence-class littoral combat ship.

Second Line of Defense

http://www.navy.mil/submit/display.asp?story_id=100454

I had a chance recently to sit down in the Pentagon with Navy officers involved with shaping the composite detachment and thinking through the way ahead in this dynamic and significant area of innovation for the fleet.

The interview was conducted with Lt. Commander Doug Kay, the Fire Scout Assistant Requirements Officer and previously was the air boss on the USS Fort Worth.

The second officer was Commander Ted Johnson, the Fire Scout Requirements Officer and former commander of an MH-60S Seahawk squadron.

FIGURE 17 THE COMPOSITE DETACHMENT AT SEA. CREDIT: US NAVY

And the final officer was Kyle Gantt, a Surface Warfare Officer who works on future ship requirements.

We had a wide-ranging conversation and during that conversation the officers made a number of key points.

First, as one officer put it: "I think one of the benefits of the manned-unmanned teaming concept is you can play to the strengths and weaknesses of each of the two.

"Right now, we're deploying Fire Scout with MH-60S detachments onboard LCS. Sierra is somewhat sensor deprived."

The dynamic decision-making is challenging to program into an unmanned platform so the pairing allows the two-man team in the MH-60S to use the data from the Fire Scout to inform their decisions.

"A Fire Scout has much greater persistence than a manned helicopter and allows it to do broad area maritime search with its payloads and to provide queuing for the manned platform."

The C2 revolution is at the heart of distributed lethality and shaping kill webs.

And the concept of a composite deployment provides support for that revolution.

As one officer put it: "I think it's all about using the payloads onboard the UAS and being able to efficiently get that information back to the right decision maker whether that right decision maker is in the cockpit of another helicopter, or that decision maker is on the ship."

Second, the crewing is being shaped to support the manned-unmanned pairing.

Crew needs to be able to maintain, support and to operate two different systems and to do so within the confines of a small ship, the LCS.

This puts a premium on shaping crew skill sets which can synergistically support the composite detachment.

As one officer put it: "When aviators break the aircraft, they fix them, both the manned and the unmanned.

"All the operators, both the crewmen and the pilots are cross-trained to operate both types of aircraft. We have dual qualified operators."

And the advantage of doing so provided a better understanding of what the dyad could deliver as an overall capability.

"What we have found is that you create a more cohesive team when the MQ-8 operators also know how to fly the 60, and the 60 operators know how to fly the MQ-8, and have changed those roles several times during the week.

"Basically, they then understand the limitations and abilities of each system and the synergy which can be achieved by operating together."

In effect, what the Navy is creating is a common operational culture shaped by the two systems, rather than creating an unmanned operational ghetto.

Third, the actual operational experience of working a composite detachment will drive future operations and future operational requirements.

It is an iterative process.

Clearly, the US Navy is acting on the assumption that one needs to get the technology into the hands of the warfighter to drive innovation rather than building better briefing charts.

After all, power point slides only kill the audience, not the enemy.

Fourth, the operational experience of the dyad will be part of shaping the way ahead with ship design, and requirements as well.

As one officer put it: "As we look at what ships we need and how to use them in the future, this concept of manned-unmanned teaming both with organic systems as well as the use of national systems use is really critical to how we will use those ships, and how we'll deliver those capabilities."

In simple terms, it is about getting best value out of systems, which operate from the deck space.

As one officer put it: "Everything that goes on the ship has to buy its way on the ship through the capability that it delivers."

In short, the composite detachment is viewed as a cutting edge capability which will be enhanced in the future.

"The future of aviation certainly offers the distributed fleet a suite of capabilities that are met between a pairing of manned and unmanned systems.

"What missions will go to the manned and unmanned, well that remains to be seen, but most definitely the future of aviation is going to be a pairing of both manned systems and unmanned systems."
Second Line of Defense

The Role of Unmanned Aerial Systems in the Remaking of the Amphibious Task Force: The Perspective of Lt. General (Retired) Trautman

2017-05-17 By Robbin Laird

President Trump has come to power at a time when a very flexible force able to insert from the sea and rapidly return to the sea has emerged.

This USN-USMC capability has migrated beyond the classic Amphibious Ready Group-Marine Expeditionary Unit (ARG-MEU) into a very flexible and lethal amphibious task force.

The evolving Marine Corps aviation assets, coupled with the reshaping of Marine Corps concepts of operations for conducting force insertion from the sea, are shaping a new capability and within that capability unmanned aerial assets are playing a key role.

One of the key architects of the Marine aviation revolution has been Lt. General (Retired) Trautman.

During his tenure as Deputy Commandant for Aviation, the Osprey began its first deployments to the Middle East, the H-1 Venom and Viper were introduced to the Fleet and the F-35B was coming to its initial fruition.

With the continued development of the CH-53E into the K and the addition of unmanned aviation, the mix of flying assets that would work with the Ground Combat Element to shape new MEU capabilities was put into motion.

I had a chance recently to talk with Lt. General (Retired) Trautman about the unmanned element and its role in the evolving way ahead for Marine Corps transformation.

Question: The UAVs going on ships now really had their origin in the land wars.

How did the process get started?

Lt. General (Retired) Trautman: It goes back to the time General Jim Conway was in Iraq with the 1st Marine Expeditionary Force and he found a little company that was making the Scan Eagle UAV.

Believe it or not, the Scan Eagle was being used for the Albacore fishing fleets up in the Pacific Northwest at the time.

In other words, Scan Eagle has a shipboard legacy already built right into it.

But, the Marines evolved the Scan Eagle principally as an asset for land based operations in Afghanistan and Iraq.

And, in recent years with the focus placed on returning to the sea it became obvious that a similar capability on board our amphibious task force would be quite useful.

That is what led us to make the selection of the RQ-21 Blackjack which is now deploying on our Marine Expeditionary Units and by all accounts it is doing quite well so far.

Question: It is very challenging to operate unmanned air systems onboard ships and could you discuss those challenges?

Lt. General (Retired) Trautman: Many people who have not spent a lot of time at sea really don't grasp the inherent challenges that you have when you launch and recover from a sea base.

The Marines over the years, along with their partners in the US Navy, have built an aviation force that's quite credible from the sea. F-35Bs, MV-22s, H-1s and the evolving CH-53K all come into the force at a very important time as our nation evolves into a better understanding of the value and proper use of the amphibious task force.

In parallel with those developments, we must figure out how to take advantage of unmanned aerial systems.

As we do that operationally, we at the same time have to experiment and learn and use systems from the sea in ways that cause us to understand what new systems we should procure in the coming decade as well.

In other words, the foundation for the future is being built with our experience on board our amphibious ships today as the new aviation assets marry up with the unmanned systems onboard our ships.

Question: And having the UASs onboard allows the Marine Corps commanders to sort out how best to use those assets in operations as well. How might they do that?

Lt. General (Retired) Trautman: If I'm a task force commander and I'm deployed somewhere around the globe, I want to be prepared to conduct operations at a moment's notice when the mission dictates.

I also want to have the flexibility to conduct all of my sorties from the sea or if necessary transition to an expeditionary land base for short duration operations that make an impact on the enemy before quickly returning to sea.

I want unmanned aerial systems that enable me to do whatever I need to do in order to accomplish the mission.

That means I need range, speed, endurance, the ability to take off and land vertically, a wide range of payloads, non-proprietary payload "hooks," and the best Size, Weight and Power (SWAP) advantage I can attain.

To do that, you have to think long and hard about the types of capabilities that you wish to procure.

Whether it's classic UAS capabilities like intelligence surveillance and reconnaissance, the delivery of precision weapons, or electronic warfare, there are a whole host of missions that unmanned systems can do with the right payloads.

The key is to have those systems with me, use them and determine how to get the most effective use from them in the widely varied operations that an amphibious task force will pursue.

Question: When you were DCA you worked the decision to sunset the Prowler electronic warfare aircraft.

That clearly has an impact on the payloads which you want to have on a UAS as well?

Lt. General (Retired) Trautman: It does.

We made the decision in 2009 to sunset the Prowler a decade out in 2019.

We did that with our eyes wide open knowing that the F-35B would be coming into the force in a more robust way by that time.

There are inherent electronic warfare capabilities resident in the F-35 but our vision also included the need for unmanned aerial systems to proliferate in the battle space to round out the electronic warfare requirements that the force will have.

We're in our infancy right now in developing those capabilities, but the first step in achieving something is to get started, and to put the capabilities in the hands of young men and women who are in the force and then evolve the capability in a way that makes sense.

I'm confident that we are on that trajectory with our unmanned aerial systems and the payloads that we will develop for those systems in the next few years.

Question: And the experience being gained now and in the next decade will clearly shape the way ahead not only for the amphibious task force but for the unmanned element. In other words, the approach is to experiment by operational use.

What happens next?

Lt. General (Retired) Trautman: The current Deputy Commandant for Aviation has been very prescient in laying out a requirement for a program called MUX (MAGTF Unmanned eXpeditionary UAS) which the current aviation plan says will be ready for initial operations in the 2025 time frame.

That platform, whatever it becomes, should have the capability to take off and land from the sea base, to take off and land from an expeditionary operating location ashore and deliver long range relatively high speed service to the fleet so that you can use that range and speed to your advantage.

It should also come in with adequate power and non-proprietary "hooks" so that future users can employ whatever payloads make the best sense for the force as it evolves.

This is a very exciting time for the development of unmanned systems in support of the amphibious task force and the Marine Corps.

The Next Phase in the Evolution of USMC UAS Capabilities: An Interview with Colonel Barranco

2017-06-20 By Robbin Laird

In my recent interview with Lt. General (Retired) Trautman, the former Deputy Commandant of Aviation highlighted how he saw the way ahead for unmanned air systems in the MAGTF:

The current Deputy Commandant for Aviation has been very prescient in laying out a requirement for a program called MUX (MAGTF Unmanned eXpeditionary UAS) which the current aviation plan says will be ready for initial operations in the 2025 time frame.

That platform, whatever it becomes, should have the capability to take off and land from the sea base, to take off and land from an expeditionary operating location ashore and deliver long range relatively high speed service to the fleet so that you can use that range and speed to your advantage.

It should also come in with adequate power and non-proprietary "hooks" so that future users can employ whatever payloads make the best sense for the force as it evolves.

This is a very exciting time for the development of unmanned systems in support of the amphibious task force and the Marine Corps.

I had a chance to follow up on these thoughts with the current senior Marine involved in working the evolving UAS issues, namely, Col. J.B. "Buss" Barranco.

Col. Barranco is an experienced Marine Corps aviator with significant combat experience. He has been an instructor at MAWTS, and has had eight deployments. He was the escort flight leader for the Afghan operation for the Marines in 2001, and then was involved in the 2003 invasion of Iraq and then back to Iraq in 2005 and 2007 as well. He worked the H-1 transition task force for Lt. General Trautman when he was DCA in 2008. He then deployed to Afghanistan again in 2010, 2011, and 2012.

When the Col. discusses platforms he does so from the standpoint of what they bring to the Marine Corps and how they integrated into the evolving capabilities of the MEU or MAGTF.

Question: Clearly, you are looking at unmanned air systems from the standpoint of how they work to enhance USMC capabilities.

How do you view the evolution to date?

Col. Barranco: "I think we've done a pretty good job of trying to fully integrate our unmanned into our manned aviation in the aircraft wings. And we are in the process of going back to sea after a long period of being focused on the land wars. We want to get back to sea.

"We want expeditionary.

"We want VTOL.

"Although Reaper is a tremendous capability is is limited to runways, and runways are going to be targeted by peer competitors. And we want to be independent of the need to use allied runways as well. Sovereignty needs to be exercised independent of absolutely needing to use allied airfields.

"These are the drawbacks of land-based systems."

Question: How then are you looking to build that VTOL capability?

Col. Barranco: "We are looking to build airborne early warning capability, and air to air capability into MUX, something that you don't find in Reaper.

"We want an expeditionary, shipboard capability.

"We are building a digital interoperable network and we want the MUX to be a node in that digital network.

"We want air to ground capability but we also want air-to-air capability as well. By being able to operate shipboard, we can free up our manned aircraft in some cases for other missions. We'd also like to have a cargo capability to avoid having to use trucks on the road when we wish to avoid that.

"The Osprey has raised the bar with regard to range and speed.

"We need range and speed that's comparable to the Osprey in the new UAS, the MUX. MUX will be a key element in our execution of distributed operations.

"We will operate our forces further from the ship and the assembly area and need to operate with smaller distributed forces that are network prior to any massing of our forces.

"The MUX will need to fit into that template.

Second Line of Defense

"Classic helicopters are not going to get it done in terms of range and speed to deliver a distributed strike force.

"The MUX by being VTOL will be heavier and give up some time on station.

"We need to operate it shipboard and have it protected against corrosion, which will add to the weight.

"But because it is expeditionary, able to take off virtually anywhere, we can give up that slight loss of time on station and range of current UASs."

Question: How does your current experience with Blackjack fit into your learning curve with regard UASs?

Col. Barranco: "Blackjacks currently operate from LPDs and are deployed with our MEUs.

"We have our second MEU using the Blackjack afloat underway right now.

"We have also done a land based combat deployment as well in Afghanistan.

"Our first MEU using the Blackjack, the 22nd, was a sea-based deployment with Blackjack supported combat ops in Libyas as well.

"It is more difficult to operate at sea.

FIGURE 18 OPERATING THE BLACKJACK AT SEA. CREDIT PHOTO: USMC

"It's not just our operators, our UAS operators, who are gaining experience at sea, but it's everyone else who's getting experience within part of a MEU MAGTF ACE at sea and learning how to use the system.

"And of course the NAVY is learning as well and this joint learning could well inform a joint acquisition of the MUX as well.

"We are deploying Blackjack in advance of MSD or the material support date.

"We always lean forward and try to get equipment into the hands of the warfighter as rapidly as possible.

"This means that the reliability rates will be lower initially but as we approach MSD then they adjust upwards.

"There are clear limitations on a Group 3 system like Blackjack, for example, it is a line of sight system.

"But we have a number of payloads for the Blackjack which give us operational flexibility, and Blackjack is evolving and will remain in the force even after we add MUX."

Question: There is a challenge clearly with how to handle data onboard current Navy amphibious task force ships.

How will you deal with this?

Col. Barranco: "There is no question that the LPDs and LHAs are going to have to see significant expansion of their ability to manage data.

"The coming of the F-35 alone would require that but as well augment UAS capabilities this demand will grow."

Question: So in effect as you are designing MUX you are building on the Blackjack experience and shaping inputs into Navy ship design as the LPD-17 morphs into LXR, for example?

Col. Barranco: "That is a good way to put it.

"The evolution of the ACE, including UASs, is driving significant change in how we need to design our ships to manage the MEU afloat and work with the MAGTF ashore.

"Marine Corps Aviation is focused on integration; not just inside the air wing, but on the MAGTF and its evolution.

"And that is how we look at the evolution of UASs in the force."

In short, the current operation of Blackjacks at sea and on land is a key part of the learning curve with regard to the operation of the systems and their integration within evolving Marin Corps operations.

As is Marine Corps practice, the Blackjack is in the force in advance of fully being able to support the force.

For the Marines it is about getting capability to the force and letting the war fighter use that capability as that capability evolves and becomes fully operational.

And the Blackjacks is part of the new Air Combat Element for the Marine Corps is impacting on the ship design for the LHR which will be modeled on an enhanced San Antonio Class ship and on the America class LHAs.

A key part of this effort is the need to expand significantly the capability to handle much larger volumes of data generated by F-35s and UASs to the ship as well. In this regard, it is the Navy-Marine Corps team, which is learning from Blackjack deployments, not just the Marine Corps.

The Marines are working to add a new more robust UAS capability to the force by the mid 2020s.

And they are hoping that the US Navy will buy in as well, and allies who are building up their amphibious fleets might well be candidates for the new platform as well.

The Marines are looking for a platform, which can fly with the Osprey, which means range and speed, are essential. It may well be a tiltrotar platform although other platform variants might be feasible as well.

This Group 5 UAS will have an open architecture system allowing complete software upgradeability to keep abreast of threats.
Second Line of Defense

The RAAF speaks of the need to build in software transient advantage and this is clearly what the Marines are looking for in their new UAS system as envisaged.

They are looking for the new platform to have a number of plug and play capabilities.

They want to it to be an armed UAS with a variety of weapons which can be configured to the mission.

With the core focus on shaping a digital interoperable MAGTF, they look to the UAS to be a key node in the network afloat and ashore.

They are looking at the new UAS as a partner with the F-35, Osprey and CH-53K, where the UAS could be as well a cargo carrier as well, dependent on the operation and the mission.

As the Marine Aviation Plan 2016 put it about one of these requirements:

"UAS are a planned critical component of the MAGTF EW concept. As such, EW expertise normally resident within the VMAQ community began to transition to the VMU community in 2015. Airborne electronic attack (AEA) capabilities post-2019 will be provided by EW payloads such as the Intrepid Tiger II EW Pod, UAS EW payloads, and the EW capabilities inherent to F-35."[2]

The new UAS will be STOVL as that fits both the shipboard and well as no fixed airfield requirement.

The MAGTF will rely on the F-35 and related systems for forceable entry, so that the UAS as envisaged will operate largely in a non-contested air environment, although arming the UAS will be crucial for its self defense in gray operating situations.

The Marine Corps Aviation Plan put forward the following as how to characterize the way ahead for UASs:

"In the 2016-2029 timeframe, the family of unmanned aircraft systems (FoUAS) provides support to any sized MAGTF for influence of the electromagnetic spectrum, battlespace awareness, offensive air support, target acquisition, force protection, and digital communication backbone. Marine Corps UAS employment will continue to enhance and extend the lethal and non-lethal capabilities of MAGTF and joint force commanders, facilitating advancements in observation, understanding, and influence on the battlefield."

"The FoUAS will play a key role in all USMC missions across the range of military operations to include forward presence, security cooperation, counterterrorism, crisis response, forcible entry, prolonged operations, and counterinsurgency."[3]

The new UAS, labeled as MUX, would leverage the operational experience of the Blackjack and combine with Blackjack in shaping a way ahead.

Given the payload flexibility of the Blackjack, this system could well complement the new MUX as well.

Clearly, the classic Amphibious Ready Group-Marine Expeditionary Unit (ARG-MEU) has migrated into a very flexible and lethal amphibious task force.

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2 https://marinecorpsconceptsandprograms.com/sites/default/files/files/Marine%20Aviation%20Plan%202016%20FINAL.pdf

3 Ibid.

THE ELECTRONIC WARFARE CASE: DISTRIBUTED CAPABILITIES FOR THE ATTACK-DEFENSE ENTERPRISE

Lt. General (Retired) Davis on Distributed Electronic Warfare Capabilities

2017-08-31 By Robbin Laird

On August 23, 2017, the Williams Foundation held a seminar on the future of electronic warfare.

With the introduction of the Growler, this has provided a natural hook into the broader discussion of the evolving payloads, which need to be part of an integrated 21st century combat force.

As Group Captain Braz put the objective of Growler introduction within the ADF:

"New thinking in terms of dynamic targeting, particularly of non-lethal effects, many of which may be temporary in nature, will be a key to success.

"Delegating these engagement authorities forward will be essential."

Lt. General (Retired) Jon Davis, the former Deputy Commandant of Aviation, echoed these sentiments within his presentation to the Williams Foundation seminar.

He described the USMC transition from a core aircraft delivering an EW effect to building out the MAGTF to include ubiquitous access to non-kinetic tron warfare capabilities.

The core approach going forward is very clear.

"MAGTF EW transitions the Marine Corps from a focus on low density/high-demand EW platforms, to a distributed, platform-agnostic strategy – where every platform contributes/ functions as a sensor, shooter and sharer – to include EW.

"Under MAGTF EW the Marine Corps is leveraging emerging technologies and integrating multiple platforms, payloads, nodes, and capabilities to provide commanders with an organic and persistent air and ground EW capability."

Davis underscored that with the changing nature of warfare and how the Marines operate, shaping a distributed strategy was a necessity, not an option.

"We operate on ships, from ships to shore and ashore.

"We cannot simply have an on call EW asset.

"We can confront the threat requiring an EW capability anywhere we operate."

He described the sun setting of the unique EW aircraft, the Prowler, in favor of a sequential role out of distributed capability to the MAGTF.

He focused initially on Intrepid Tiger which is an EW pod being incorporated the Marine Corps legacy air.

It is on the Harrier and UH-1Y currently but will be added to other aircraft in the force.

"It's made over 20 deployments now.

"It's an open architecture system.

Second Line of Defense

"It does electronic surveillance; it does electronic attack.

"We have a new one called Intrepid Tiger Block 2X which is being built to do radar jamming.

"It's about 305 pounds for the Harriers and Hornets.

"It's going to go next on V-22 then on C-130 and then on the CH-53 helo.

"We had about 120 we've built so far, we have 268 in the program of record."

It's completely an open architecture.

"And we have invited manufacturers if they have a card that can fit into the system to propose putting it into the pod.

"If you have a card that fits in that slot and you can do so, bring it and you can plug it in, but do not ask us to change the box for us to take your card.

"You have to adapt your card to fix my box."

The Marines are deploying the F-35 at the same time, which is a core capability for the USMC in delivering non-kinetic effects throughout the distributed force as well.

"The F-35 is part of our electronic warfare strategy for the United States Marine Corps. Indeed, it is a key part of our strategy."

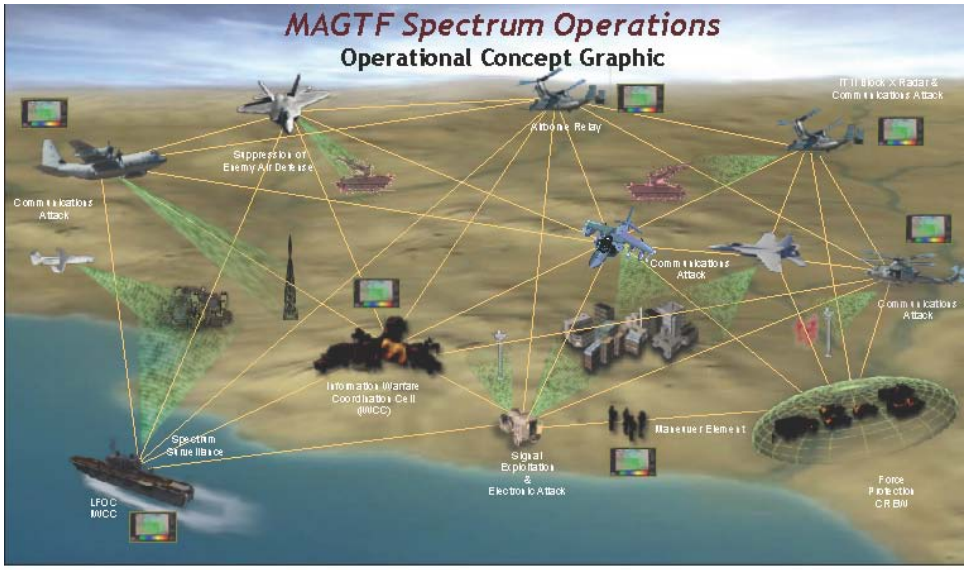

FIGURE 19 MARINE CORPS ILLUSTRATION OF THE EW KILL WEB

He then described an exercise involving the F-35.

"We were doing a drill, and the F-35 does a great job at a lot of things.

"It does a very good job in terms of electronic warfare as well.

"Bottom line, I was out there, I saw four ship of F-35s, and the scenario was a double digit SAM threat, it was 1,000 foot overcast, we had four Bs out there, we had a forward air controller on the ground, and these guys had launched off the ship and they were overhead, and they were going to go take out ground vehicles and suppress and shutdown the SAM.

"We brought in all of our senior one and two star generals. In short period of time, the F-35s got rid of the SAMs.

"They were operating more like a pack of dogs than ever seen in 36 years of flying strike airplanes including being the CO of the Weapons School.

"It was a work of art.

"The infantry officer came at the end came up says, "Hey, that was fantastic, but I think that's not very realistic."

"We need to capture it on live streaming video see we can see a confirmation of those targets."

"I commented: Well it's overcast, they're not going to be streaming video, and you're probably not going to have a Reaper out there, right? It's going to get shot down."

"He goes, "We need more time so we can review the video feeds."

"I said, we have to remove the admirals and the generals out of the kill chain.

"If the pilots have got the right RoE, let them loose.

"If you inject too many decision makers from on high, you're going to get Solders, Sailors and Airmen killed."

Davis added: "We're going to grow the F-35; We're going to be very aggressive about growing capabilities in the F-35. It's good at what it does right now; it'll be a hell of a lot better in the future."

He then went on to describe other roll-outs of evolving EW capability for the MAGTF.

The Blackjack UAV, which has a modular payload structure, has an EW payload inside as well and is currently working with the USS America amphibious group.

The goal is clear: "There will never be a Marine infantry unit or a group on the ground that will not have access to electronic warfare capability.

"The guys on ground can go up and e-connect.

"Almost like they're going to a server in the sky and pulling the information for them, he or she can basically pull the capability down from the air asset."

The next platform, which will provide an EW delivery capability to the MAGTF will be the Group 5 UAV, the Marines are working on right now.

This will be a VTOL UAV and will have an open architecture with modular payloads.

And clearly one of those payloads will be an EW one. And by having a VTOL asset this can provide MAGTF support throughout its operational cycle, whether on the ship, coming off the ship or operating ashore.

Second Line of Defense

He concluded by reminding the audience of the philosophy of the Marine Corps as the big green killing machine. It was not about the fair fight; it was about speed and combat success against a determined enemy.

He quoted the most famous Australian general officer from World War I, General Sir John Monash to provide perspective on how the Marines looked at the inclusion of EW as a ubiquitous asset for the MAGTF.

"The true role of infantry was not to extend itself upon heroic physical effort, not to whither away under merciless machine gun fire, not to impale itself upon hostile bayonets, but on the contrary, to advance under the maximum possible array of mechanical resources, in the form of guns, …tanks, mortars and aircraft; to advance with as little impediment as possible; to be relieved as far as possible of the obligation to fight their way forward."

Editor's Note: During the panel discussion after the presentations by Group Captain Braz and CDR Mike Paul, a question was asked about the challenge of working with the US Navy and its approach leveraging Growler and the USAF's approach to leveraging fifth generation aircraft in shaping a way ahead.

The answers were quite noteworthy.

Group Captain Braz viewed the RAAF as in an interesting bridging function between the USN and USAF and playing a potentially useful and significant role in shaping integrated capability across the RAAF, the USN, and USAF as well.

"The diversity that we bring is very useful in shaping the combined team of US Navy and US Air Force capabilities."

Lt. General (Retired) Davis from the floor added his thoughts on how integration is proceeding in the US.

He sees the schools, MAWTS-1, Nellis and Fallon as key elements in shaping an integrated force. He mentioned that a Marine is for the first time teaching at Nellis and a USAF pilot is training at MAWTS-1 and will be an instructor there as well.

"The more we learn from each other, the better we will be."

And then CDR Paul added that it remains to be seen how the US Navy will employ the F-35 but that cross learning from the USMC and the USAF will be crucial in this process.

Group Captain Braz on the RAAF and the Way Ahead on Electronic Warfare: Shaping a Core Distributed Capability for the Integrated Force

2017-08-28 By Robbin Laird

On August 23, 2017, the Williams Foundation held a seminar on the future of electronic warfare.

At the heart of the Seminar and the discussion were the presentations by Group Captain Braz of the RAAF, a key figure in the introduction of the Growler into the RAAF, and CDR Mike Paul, Electronic Attack Wing, US Navy Pacific Fleet.

The two provided a significant look inside the standing up of the RAAF capability and the key role of the US Navy in this effort, and in turn the ability to standup up a joint capability.

The US Navy has provided an important lead in working the relationship with the RAAF in standing up this capability and in a rapid manner. In many ways, the Growler dynamic between the two forces provides a

model of how capabilities can be generated rapidly in a coalition context to deal with an evolving threat environment.

For the RAAF, Growler represents a jump start to a 21st century EW effort, which includes Wedgetail and F-35. For the US Navy the cutting edge work which the RAAF is doing with regard to shaping a 21st century integrated force helps the US Navy to think through ways to break through stove piped thinking.

In this article, I will look at Group Captain Braz's presentation with regard to the RAAF approach.

I had a chance to meet with him last Spring at Amberley Airbase where the RAAF is standing up the Growler capability.

So for me, it was a real pleasure to see him again, but this time, in the context of a broader discussion of evolving capability with other core players in the effort as well.

The nature of the working relationship between the US Navy and the RAAF was highlighted during that interview as follows:

FIGURE 20 GROUP CAPTAIN BRAZ AT ADELAIDE AIRBASE. SPRING 2017. CREDIT: SECOND LINE OF DEFENSE

We couldn't have done this without a huge commitment from the U.S. Navy. There's simply no other way to describe that.

They have wanted us to be on this journey, and they have supported us wholeheartedly throughout it, both on what we do with the Growler training and the operational experience, the exchanges we've established, and how we prepare the team.

That's furthered by exchange opportunities. We have U.S. Navy Growler aircrew joining us here, but we've also used folks connected to intelligence organizations and data management organizations and used U.S. Navy expertise in those areas to bring us along and further on the journey.

It's no accident that when the Growler officially arrived in Australia at Avalon International Air Show a month or so ago, one of the four humans to step out of those two aircraft was a U.S. Navy aviator.

That was very deliberate, because we wanted both to recognize the amazing support we have had so far from the US Navy and the fact that we're in this together.

Second Line of Defense

It's a partnership for the long term with cross learning on all sides.

Captain Braz noted that the Aussie Growlers were on track for IOC next year and that "6SQN took part in Talisman Sabre, and they are busy baselining their operations to align with wider Air Combat Group and 82Wing standards."

He underscored that the RAAF was focused on taking EW from a niche capability within the ADF to working into a core competence within the integrated force.

"How we might drive this jet, and wider EW and cyber thinking, into the mainstream?

"Please note my use of the word drive. We need to take this thing and forcefully insert it into our daily business.

"To let it drift or meander into some equilibrium would be a lost opportunity.

"It's time to be bold.

"The arrival of F-35 in the next year or so is one prime opportunity, and one that will need bold leadership to harness.

"The F-35 brings unprecedented EW capability, it can fight like no other fighter we have owned.

"Growler is an exceptional complementary capability and crossing personnel over between the teams will bring amazing results.

Group Captain Braz at the Williams Foundation Seminar on Electronic Warfare, August 23, 2017

"A good friend of mine from the US Navy planted this idea in my mind some months ago and it has significant merit.

"Setting up a Growler to F-35 exchange program won't be easy, it won't fit well into a transition plan and it will challenge some outdated mindsets, but it will be a brave move that will put innovation into overdrive.

"It's an example of the new thinking we need to reshape the way we fight air combat."

Group Captain Graz then dealt in the rest of his presentation on the challenges as he saw them in managing the way ahead.

First, there is the challenge of managing growth.

Growler is a low density, high demand asset. Shaping and managing a workforce and ensuring its integrated beyond the platform is a significant challenge.

Second, Growler will operate under significant constraints in spectrum licensing and security.

Third, "Growler is part of the overall rethinking necessary with regard to targeting or rethinking with regard to payloads for the RAAF operating as part of an integrated 21st century combat force.

"Growler is a flexible system, manned by expert crew.

"It takes the initiative whenever possible but is by design a flexible sense and respond asset that is at its best when given significant latitude in targeting.

"Being overly tied to our kinetic and lethal effects targeting mindsets will not give you the Growler you need on the day.

"New thinking in terms of dynamic targeting, particularly of non-lethal effects, many of which may be temporary in nature, will be a key to success.

"Delegating these engagement authorities forward will be essential."

Fourth, training to ensure that EW becomes part of the force, rather than a stove piped on call capability is a major challenge.

"We have invested heavily in training and rightly so; we are not there yet but the future is positive.

"Importantly, the rapidly evolving Electronic Warfare capabilities across the ADF need new ways of thinking to get the most from our family of systems.

"New training areas that test our ability to find, fix, track, target and engage adaptive threats are fundamental to our force.

"Of course, with the constraints already mentioned, live virtual and constructive environments are being enhanced and expanded to serve our needs.

"Ultimately fifth generation forces need fifth generation training."

Fifth, the Group Captain emphasized the importance of what he called commonality both across the ADF and the allied forces using Growler.

"We have made changes to these jets (RAAF Growerls) based on Australian needs but they have changed the US Navy common baseline.

"Careful investment has given our Growlers targeting pods and Infra-red missiles.

"Not because it's a fighter but because they help our active and passive kill chains.

"The US Navy is joining this path; it's a team effort and our differences bring useful diversity to shape the growth of this aircraft."

And the final challenge he addressed really flowed from how he saw the introduction of Growler as part of the broader evolution of the RAAF to support a payload revolution.

"Our thinking needs to cover payloads not just platforms and be driven by creative technical thinkers, connected with operators."

Group Captain Braz ended on a very forceful note – don't built a community of Growler operators; build a joint force within which EW is a core distributed competence.

"Our true challenge, as swimmers in the mainstream, is to acknowledge the currently niche players in EW, assist their real and important growth and to drag them into our swim lane; to roll their input and concepts into every plan, to seek to understand more and engage better.

"Our new thinking must be beyond labels like EW operators but that this expertise permeates our business as an assumed skill.

"So, as a strike fighter native, I am happy to wear an EW tag but I want it to be a temporary one.
Second Line of Defense

"The day where we are all suitably learned in EW that it no longer becomes a label is what we should strive for.

"That would signify success.

"That would have seen the mainstream embrace EW and cyber.

"So, my challenge to you is, regardless of your organisation, are you an operator in our age of EW?"

A US Navy Perspective on the Way Ahead for EW Capabilities: CDR Mike Paul at the Williams Foundation Seminar on EW

2017-08-29 By Robbin Laird

Earlier, I had a chance along with Ed Timperlake to visit HAVOC at the Naval Air Warfare Development Center, and to get the perspective from Fallon on the evolution of EW within the joint force, seen from a US Navy perspective.

In that interview, there was a clear emphasis on Growler as part of a larger effort, and a piece of the puzzle to solve how best to survive and prevail in the contested battlespace.

"There are many of us around here who think that the concept of the E2D the F35 and the Growler integrating would accelerate our transition to where warfare is going with regard to the contested battlespace.

"There are many of us around here who think that would be an outstanding idea that we should really push for and should be a focus of testing and evaluation.

"But there will be people around as well who will say but how does that lead to me dropping bombs?"

The integration piece and getting those who think in legacy kill chains to embrace a very different way of thinking, namely the kill web was also emphasized by CDR Mike Paul when he presented at the Williams Foundation and participated in the panels and discussed these issues over dinner at the Foundation as well.

A key element of shaping the way ahead was highlighted not only in his presentation but the presence of the US Navy Growler community in Australia.

The US DoD's new EW Strategy tells us that Electronic Warfare underpins U.S. national military objectives through demonstration of electromagnetic spectrum (EMS) superiority. "A force multiplier for a range of military operations, EW maximizes lethality of precision strike weapons, assures mission command and increases mobility by protecting complex battle networks, weapon systems and forces. EW provides rapid situational awareness and produces chaos in adversary decision-making."

The fact is that U.S. military operations are rarely conducted unilaterally and are increasingly reliant on contributions from our partners and allies. The Navy I think has done great work, ensuring EW development efforts are interoperable, and aligned with our allies (the Growler is a good example). The battlespace awareness you get with the passive sensing capabilities in the Growler is not free – by nature, our mission requires interoperable data sources and software formats.

In fact our Chief of Naval Operation's Maritime Strategy states that we must also expand opportunities for coalition EW training and education in the U.S. and abroad. We're tasked to build or enhance partner EW capabilities and capacity, and ensure partner and ally capabilities remain viable against emerging peer or near-peer threats.

Of the 4 Objectives in the DoD's EW Strategy, we like to say we achieved the "4th Objective" – to foster access, enhance interoperability and grow warfighting capacity – at least at the operational and tactical levels.

This is Operational partnering. It's easy to say "no," or "you can't," much more difficult to say yes. We had plenty of hurdles, some seeming impossible. I count significant "No's" that were turned into yes.

A significant part of the presentation detailed how the integration of the RAAF with the US Navy Growler force was achieved and in relatively compressed period of time.

This is a case study in many ways of the kind of integration, which the US and the core allies need to achieve to have the kind of force multiplier effect from an integrated coalition force.

Figure 21 **Four EA-18G Growlers arrived at Joint Base Pearl Harbor-Hickam before moving on to Australia, Feb. 16, 2017. (U.S. Air Force photo by Tech. Sgt. Heather Redman)**

This event is a great opportunity to mention some of the wins we've had in operationalizing our partnership in Airborne Electronic Attack (AEA).

We at Whidbey Island and leaders in NAVAIR removed years of cultural barriers limiting collaboration in a short amount of time.

That took people to lead and innovate. But that's what it took to begin to operationalize a strategic AEA partnership.

Our stated goal was to produce 100% fully capable & interoperable EA-18G wingmen, at all security levels.

At one point we had roughly 45 Australians invading the Pacific Northwest of the US making lasting friendships… our neighbors… babies being born… We went "all in." We formed personal relationships that make the distance between Canberra and Pacific Northwest coast seem insignificant. Now look at what 6SQN did during their IOT&E for Growler. Amazing.

CDR Paul outlined that the non-kinetic payload was growing in importance both for adversaries and the US and allied forces, but that it was clearly different from a kinetic action.

Second Line of Defense

EW is unlike kinetic air-to-ground payloads that simply require target coordinates, or an air-to-air missile that needs an appropriate target.

As CDR Mike Lisa, Commanding Officer of a "combined RAAF USN squadron" best stated, "it requires our sensors to call the signals the exact same thing, employ the exact same waveforms/payloads, and deliver at the exact same time with exact positioning."

This means that the secret ingredient within an effective EW contributor to the joint fight is a well trained, effective and coordinated workforce.

At the peak of my Wing's support phase to 6 Squadron standup in March, we had Australian students and instructors alike in our replacement squadron, Australian officers operationally employed in 3 different squadrons – primarily in this part of the globe.

Multiple deployments to the PACOM AOR, multiple reps and sets of high end exercises, Australian aircrew were put in leadership roles in the squadrons in the air and on the ground.

Australian maintainers getting on the job training during pressurized Growler Tactics Instructor course sortie rates.

That is, in order to get the right effect or impact there is a clear need for the EW team to be on the same page, to understand the signals they are reading, what they mean and to dial up the correct response to have the desired effect or impact.

It takes work to innovatively maximize our capabilities. For the US Navy, it has taken perseverance to innovate from a standoff EA-6B Jammer mindset, to a platform and community of experts focused on distributing battlespace awareness and attacking the enemy's kill web across all mission areas.

It all relies on a well-trained EMW workforce

Growler-specific, Operational EW-Personnel Qualification Standards for our enlisted sailors

A focus on efficient improvement of pre/post mission data analysis

Air Wing Fallon validation of HAVOC tactics

Advanced technologies + today's AEA suite

World-class Information Warfare team providing efficiencies for VAQ (Electronic Attack Squadron).

Because of the nature of the blended capability one needs between technology and the work force, for EW to work within a coalition force, there needs to be tight integration.

This is why the way the US and Australia are working the issue is so crucial to mission success.

During his presentation, he presented a photo within which showed the team necessary to execute the EW mission. And he had this to say about the team and the challenge.

FIGURE 22 PHOTO INCLUDED IN PRESENTATION BY CDR MIKE PAUL.

On the right side of the lower picture is Petty Officer Amber Hart. She understands who does weapons-to-target pairing for non-kinetics – she does! She wears an Information Warfare pin. She's a warfighter and understands that modern, data-hungry aircraft are a mission-kill without her.

Our CAOCs are excellent at creating a Master Air Attack Plan and JDPI apportionment. The CFACC can tell you exactly what his JDPI servicing capacity is at H-hour of a conflict.

But if we do not put the "right" payloads on the "right" target, we become less lethal.

Simply put, having the same equipment is not enough.

Mission effectiveness requires that we think alike, train alike, and speak the same EW language.

Given the differences between kinetic and non-kinetic targeting, having tight integration of technology and training (TTPs) was crucial in shaping a 21st century EW Warfighting capability.

What's in the wingtips of that EA-18G, when operating the full capability, is unparalleled battlespace awareness distributed to the airborne force. And the Navy continues to invest in its passive sensing capabilities as our adversary systems become more complex.

And well integrated with 5th gen aircraft capability, and in about 4-5 years, next gen EA capabilities.

But EW boxes and aircraft are not what makes this work – it takes people and innovation with complicated EW technologies to realize the capability.

When we were at Fallon, we discussed how the US Navy and Air Force are working integration of EW capabilities and the challenges to doing so.

The Aussies are working Wedgetail with F-22s, and the US Navy is working Growlers with F-22s, and at the Red Flags they are now working F-35s, with F-22s, with Growlers, with the new EW capabilities on the Typhoon to shape ways to deliver integrated EW combat capabilities.

This is clearly a work in progress.

Second Line of Defense

I had the opportunity to see it up close in Red Flag Alaska last year. 4th gen Canadian classic hornets, F-15Es, VAQ-135 Growlers (with Aussie crews), Raptors, Wedgetail. Everyone has gaps – physics has limits.

But our innovative JO's roll up their sleeves and mission plan, making EW/SEAD contracts with their counterparts – they're talking spectrum; sensors; gaps in capabilities; and contracts to ensure that non-kinetic effects are layered and distributed to increase lethality across the force.

It takes work to maximize innovatively our capabilities. For the US Navy, it took perseverance to innovate from a standoff EA-6B Jammer mindset, to a platform and community of experts focused on distributing battlespace awareness and attacking the enemy's kill web across all mission areas.

As CDR Paul summarized how he saw the way ahead: "An innovative, team-based collaborative culture that ingrains Information Warfare strengthens the VAQ community's enduring international partnership in EW."

IN LIEU OF A CONCLUSION: AIR COMMANDER AUSTRALIA FOCUSES ON THE WORK IN PROGRESS

2017-08-21 By Robbin Laird

During the current visit to Australia, I had a chance to talk with the newly appointed Air Commander Australia, Air Vice-Marshal Zed Roberton.

I have had the chance to talk with him before so this meeting was more in the mode of continuing the conversation and shifting to the focus of his new responsibilities.

And that is where we started the interview.

Question: You have gone from being the head of the fighters in the RAAF (Air Combat Group) to now dealing with the entire sweep of the RAAF (Air Commander Australia).

What is the major difference for you as you shift positions?

Air Vice-Marshal Roberton: I am going from making a contribution to shaping a fifth-generation air force to ownership of the transition.

It is only changing one word, but it is a big change.

The focus changes from working the F-35 / Growler / Super Hornet mix that air combat group has to contribute, to the transition of the entire RAAF into a fifth-generation joint force.

A key challenge is recruiting and training the new force; how to target the right people and how to train them.

We focus on things like categorization schemes, which is our way of accrediting and giving mission assurance for our people.

For example, a section lead, which is our category C, is significantly different for an F-35 pilot than it was for an F-18 pilot. Fundamentally different.

And this is true for Growler and other aircraft types as well.

Question: You have raised the question of the shift in recruitment and training with regard to your pilots.

How would you regard the shift on the demand side for the pilot?

Air Vice-Marshal Roberton: You go from having to manage a package to being a node, a sensor, and a shooter in a network.

We are no longer operating as little bespoke package and building block of a force.

If you're doing this properly to prepare for a fifth-generation fight, you start them in the middle of the web, and our warfighters understand what they can contribute and where they can draw upon to be a sensor and a shooter in that web.

And that's not just airpower, that's across the entire joint space.

This requires us to fundamentally change our exercise approach to train aviators in the kill web. It is a fundamental in dealing with the kinds of adversaries we find in the real world.

We cannot take yesterday's "block and tackle" combat aircraft approach to train to be the kind of distributed mission commanders we need in the future air combat force.

We need to focus on the sensor-shooter relationship in which we can deliver distributed kinetic and non-kinetic effects.

And this comes from within the kill web.

Put another way, you are training for autonomy in all of the weapon shooter nodes and crafting the overall impact accordingly.

Our decisive advantage is going to be in our ability to operate in high-tempo ops, fully networked.

That's what will make it a completely unfair fight.

It's not going to be about mass and numbers; that will always have a part to play.

But our decisive advantage has to be our ability to just run our kill web at high speed.

We have parts of our organization that are now thinking at the tactical and operational level in fifth-generation sense, but we are yet to exercise the enabling and support function in that same mindset.

That's a challenge for us.

Question: One of your first tasks as Air Commander Australia was to participate in Talisman Sabre 2017.

What was your role and what did you find during the command post segment of the exercise?

Air Vice-Marshal Roberton: I was a month and half in the job when I had the chance in July to work as the deputy CFACC to General O'Shaughnessy at PACAF for the exercise.

I was on the CPX side, and the scenario was good for a couple of reasons.

Firstly, it commenced on day 42 of a war, assuming established air superiority.

Then the exercise transitioned where a near-peer country came into the war and we had to reestablish air superiority.

It was challenging to deal with the problem.

Second Line of Defense

It was absolutely fascinating to observe asset distribution, and where did you put your fifth gen contributors.

This was fifth gen fighters and systems to reestablish air superiority.

That old metaphor: air superiority is like oxygen; when you've got it you never even think about it. But when you haven't got it, you cannot think about anything else.

And so the surface combatants' commanders became fascinated with our ability to reestablish air control, and that was fundamentally driven by the disposition of fifth gen assets in the exercise region.

In the Pacific theater, the USAF has F-22s which is great.

However, the US are well behind several other countries in getting F-35s in their orbat.

When we had to reestablish air superiority, the discussion was no longer: where do we put our mass?

It actually became: where is our fifth-generation effect?

And that drove the fight, driving the entire operational design for the campaign.

And it was immensely successful.

We lost air superiority for minimal time with the introduction of a near-peer adversary.

Question: The F-35s are already in the Pacific with the Marines and you soon will have some in Australia.

How do you view this transition in terms of where you want to go with the entire combat force?

Air Vice-Marshal Roberton: The Marines actually have a very modest number of F-35s here now but they are quite critical in certain areas.

I have a great affinity for the Marines having done an exchange with them.

They are making a great contribution.

There's no hiding that stark difference between legacy and fifth generation aircraft.

When you actually see it, or don't see, as the case may be!

And when operators see the difference the reaction is very clear: "So now I get it.

"Imagine what we could do with those systems if they were working with our ground forces, our ships, with our other aircraft like the Wedgetail."

And that is a major challenge: to work together to take advantage of the new assets to shape an overall fifth generation force.

For example, we're doing a command-and-control futures study at the moment.

We are trying to get folks to think about how to command-and-control in a higher tempo, contested environment with a fifth-generation force?

We are sponsoring it through our Air Warfare Center, but we're involving the other services and components.

We are not going to be an effective force unless our army and navy joins the RAAF on that fifth-generation journey.

And last April I met with then Air Commodore Roberton at Amberly Airbase and he provided the perfect conclusion for this report:

“We are taking a kill web approach and working to integrate the non-kinetic into the force.

“We have to shape a cultural revolution.

“We need to get away from being comfortable with knowing what contribution my platform can make to the fight in very narrow terms.

“With the evolving concepts of operations, we don’t really care where the weapon comes from; we don’t really care how the information is passed.

“We need to have a framework where that’s devolved to the lowest effective level and we achieve it as a team.

“That’s kinetic and non-kinetic effects. That’s with regard to all different sorts of platforms.

“The faster you take a concept and a platform and weapons system and focus on its impact or effect at the tactical level, then the smart young women and men in our force will find a way to innovate in a way that we’ve never seen before.”