The 21st Century Fighting Navy: Shaping a Way Ahead

2/19/20

The Key Role of Naval Aviation

This Special Report focuses on how the US Navy is reshaping its capabilities for the 21st century fight.

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THE KEY ROLE OF NAVAL AVIATION

Second Line of Defense

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FROM THE INTEGRATED TO THE INTEGRATABLE AIR WING: THE TRANSFORMATION OF NAVAL AVIATION

By Robbin Laird

2/19/2020

The US Navy over the next decade will reshape its carrier air wing (CVW) with the introduction of a number of new platforms.

If one simply lists the initial operating capabilities of each of these new platforms, and looked at their introduction sequentially, the "air wing of the future" would be viewed in additive terms – what has been added and what has been subtracted and the sum of these activities would be the carrier air wing of the future.

But such a graphic and such an optic would miss the underlying transformation under way, one which is highly interactive with the USMC and the USAF.

A case in point is the coming of the F-35C to the carrier wing.

One could discuss the difference between 4th and 5thgeneration aircraft, and the importance of the fifth-generation aircraft, already operating from amphib decks with the USMC, but it is much more than that.

Such a focus would be limited to what I have called F-35 1.0, namely, simply bringing the aircraft to the force and sorting through how to support it.

But the US Navy is focused directly on F-35 2.0 which is how to leverage the aircraft to transform the combat force into the integrated distributed force.

The coming of the F-35 is a trigger point for a significant remake of the CVW.

The entire process is rethinking the building, operations, transformation, and interaction of the F-35 (and not just operating from the carrier but working with other F-35s in the joint and allied forces) with the core Naval combat force to be able to generate concentrated combat power at the point of interest needed in a crisis.

One clearly needs a different optic or perspective than simply taking an additive approach.

The graphic below highlights a way to think about the process of transformation for the carrier air wing over the next decade.

FIGURE 1 THE DECADE AHEAD FOR THE CARRIER AIR WING (CREDIT: US NAVY)

What is underway is a shift from integrating the air wing around relatively modest and sequential modernization efforts for the core platforms to a robust transformation process in which new assets enter the force and create a swirl of transformation opportunities, challenges, and pressures.

How might we take this new asset and expand the reach and effectiveness of the carrier strike group?

How might it empower maritime, air, and ground forces as we shape a more effective (i.e. a more integratable) force?

During a recent visit to San Diego, I had a chance to discuss such an evolving perspective with the Navy's Air Boss, Vice Admiral "Bullet" Miller.

We started by discussing the F-35 which for him is a major forcing function change in the CVW.

But his focus is clearly upon not simply introducing the aircraft into the force but ensuring that it is part of the launch of a transformative process for shaping the evolving air wing or what I call F-35 2.0.

The F-35 is coming to the force after a significant investment and work by the US Navy to rebuild its operational capabilities after several years of significant sustainment challenges.

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But now the Air Boss is looking to focus his attention on enhanced combat lethality which the fleet can deliver to the maritime services and the joint force.

What is being set in motion is a new approach where each new platform which comes into the force might be considered at the center of a cluster of changes.

The change is not just about integrating a new platform in the flight ops of the carrier.

The change is also about how the new platform affects what one can do with adjacent assets in the CSG or how to integrate with adjacent U.S. or allied combat platforms, forces, and capabilities.

To give an example, the U.S. Navy is replacing the C-2 with the CMV-22 in the resupply role.

But the Navy would be foolish to simply think in terms of strictly C-2 replacement lines and missions.

So how should the Navy operate, modernize, and leverage its Ospreys?

For Miller, the initial task is to get the Osprey onboard the carrier and integrated with CVW operations.

But while doing so, it is important to focus on how the Osprey working within the CVW can provide a more integrated force.

Vice Admiral Miller and his team are looking for the first five-year period in operating the CMV-22 for the Navy to think through the role of the Osprey as a transformative force, rather than simply being a new asset onboard a carrier.

Hence, one can look at the CMV-22 innovation cluster in the following manner:

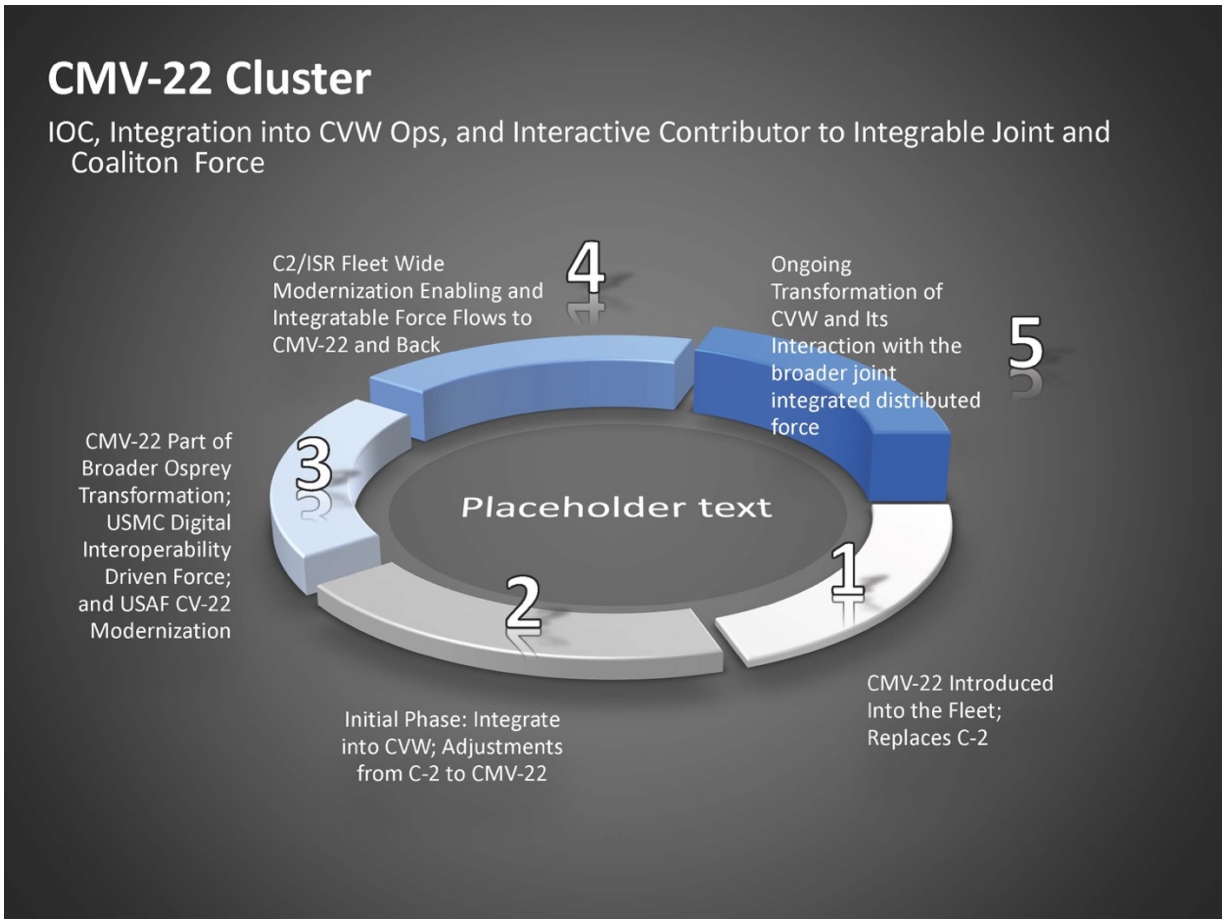

FIGURE 2 HOW THE CMV-22 WILL FIT IN AND SHAPE THE INTEGRATABLE AIR WING. CREDIT: SECOND LINE OF DEFENSE

Such an approach is embedded in the rethink from operating and training an integrated air wing to an integratable air wing.

Vice Admiral Miller provided several other examples of how this shift affects the thinking about new platforms coming onboard the carrier deck.

One such example is the new unmanned tanker, the MQ-25.

The introduction of this new air asset will have an immediate effect in freeing up 4th gen fighters, currently being used for tanking, to return to their strike role.

Even more importantly from a transformation perspective, the MQ-25 will have operational effects as a platform which will extend the reach and range of the CVW.

But MQ-25 will be a stakeholder in the evolving C2/ISR capabilities empowering the entire combat force, part of what, in my view, is really 6th generation capabilities, namely enhancing the power to distribute and integrate a force as well as to operate more effectively at the tactical edge.

The MQ-25 will entail changes to the legacy air fleet, changes in the con-ops of the entire CVW, and trigger further changes with regard to how the C2/ISR dynamic shapes the evolution of the CVW and the joint force.

The systems to be put onto the MQ-25 will be driven by overall changes in the C2/ISR force.

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These changes are driving significant improvements in size, capability, and integration, so much so that it is the nascent 6th gen.

This means that the USN can buy into "6thgen" by making sure that the MQ-25 can leverage the sensor fusion and CNI systems on the F-35 operating as an integrated force with significant outreach.

It is important to realize that a four ship formation of an F-35 operating as an integrated man-machine based sensor fusion aircraft is can operate together as a four ship pack fully integrated through the CNI system, and as such can provide a significant driver of change to the overall combat force.

This affects not only the future of training, but how operations, training, and development affect individual platforms once integrated into the CVW and larger joint force.

This will have a significant impact on Naval Air Warfare Development Center (NAWDC) based at Fallon.

A key piece in shaping the integratable air wing is building out a new training capability at Fallon and a new set of working relationships with other U.S. and allied training centers.

Later this year, we will visit Fallon and provide more details on the evolving approach.

The head of Fallon, Rear Admiral Richard Brophy, joined the conversation with the Air Boss, and clearly underscored the challenge: "How do we best train the most lethal integrated air wing preparing to deploy, but at same time, prepare for the significant changes which introducing new platforms and concepts of operations can bring to the force?

As the Air Boss put it: "We need to properly train the integratable airwing and we are investing in expanded ranges and new approaches such as Live Virtual Constructive training.

"I often use the quote that 'your performance in combat never raises to the level of your expectations but rather it falls to the level of your training.'

"This is why the training piece is so central to the development for the way ahead for the integrable training.

"It is not just about learning what we have done; but it is working the path to what we can do."

Consider the template of training for CVW Integration.

On the one hand, the CVW trained at Fallon needs to prepare to go out into the fleet and deliver the capabilities that are available for today's fight.

On the other hand, as this template is executed, it is important to shape an evolving vision on how to operate platforms coming to the fleet or how those assets have already been modified by software upgrades.

A software upgradeable fleet, which is at the heart of the 5th gen transition and which lays down the foundation for 6th generation c2/ISR provides a key challenge.

The F-35 which operated from the last carrier cycle, or flew with the P-8 or Triton, all of these assets might well have new capabilities delivered by the software development cycle.

How to make certain that not just the air wing, but the commanders at sea fully understand what has changed.

The challenge is to shape the template for training today's fleet; and to ensure that the template being shaped has an *open aperture* to handle the evolution of the CVW into the evolving integrated and distributed force.

Two measures of the change in the shift from the integrated to the integratable CVW which we discussed are the question of how to measure the readiness of a fifth-generation aircraft and the second is the creation of a new patch in Fallon, which builds upon the lessons learned during the early TOPGUN days.

The first is that aircraft readiness is a key measure of combat preparedness.

Rates of aircraft availability for a combat aircraft, can it fly or not is a baseline indicator of combat availability.

But for VADM Miller, the F-35 needs to be measured by a different standard given its key role in enabling an integratabtle CVW, namely full mission capability.

Can the aircraft fly with its full mission capability today?

This expectation reflects the F-35's role as a flying combat system, mission manager, and sensor fusion generator for the air wing and strike group.

The second is the creation of the Maritime ISR or MISR patch.

MISR officers are trained as ISR subject matter experts to operate at the fleet or CSG level and to work the sensor fusion for the integratable CVW.

According to the Air Boss: "I think of MISR as additive, not lessening of TOPGUN, but instead akin to a new phase which builds upon our historical experience in the development of TOPGUN in the first place."

FIGURE 3 THE NEW NAVY MISER PATCH

In effect, these are "6th generation officers" in the sense of working the C2/ISR capabilities which enable an integrated and distributed fleet to have its maximum combat impact.

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In short, the fleet is in the throes of significant transition.

The emergence and forcing function of an integrated CVW is at the heart of the transition.

And the emergence of a new patch at NAWDC certainly highlights the change.

Air to air combat skills remain important but now with your wingman miles away in a fifth generation aircraft context, or Aegis operating as your wingman, the C2/ISR revolution is highlighting the evolving capabilities of integration for combat dominance.

Note: Ed Timperlake introduced the notion of Aegis as my wingman to an AFA conference some years ago and Robbin Laird introduced the concept of the long reach of Aegis in a Proceedings piece published in January 2012.

CMV-22B IS ON ITS WAY: VISITING AMARILLO

02/10/2020

By Robbin Laird

Last Friday, the US Navy and the Bell-Boeing team hosted an event in which the CMV-22B was rolled out.

The ceremonial delivery was held on February 7, 2020, but the week before the first aircraft had landed at Pax River for its final round of testing before going to the fleet next week.

The first CMV-22B deployment is less than a year from the initial delivery of the aircraft which means that from the 2015 initial funding for design work to the 2018 production contract, the aircraft will be operational within six years from contract to delivery.

Obviously, this means that the Navy has leveraged the many years of experience of the USMC and the USAF in operating, maintaining and upgrading the aircraft, to leverage a common asset, to get a new combat capability.

The aircraft is replacing the venerable C2 aircraft in the carrier onboard delivery role, but from the outset is designed to provide a wider set of roles, including search and rescue and support for Naval Special Warfare.

But this is just the beginning.

As Vice Admiral Miller argued in the interview above, , the initial task is to get the Osprey onboard the carrier and integrated with its initial air wing operations.

But while doing so, it is crucial for the Navy to work the integratable piece, namely, what can an expanded aperture for the Osprey working within the CAG provide for the integratable air wing?

Such an approach is embedded in the rethink from operating and training an integrated air wing to an integratable air wing.

The aircraft itself is modified from the Marine Corp and Air Force versions with an enhanced fuel capacity which required some wing modifications as well to deal with the enhanced weight. The photo below shows off the fuel blister that provides this variant extra range and endurance.

There is another key aspect as well.

The CMV-22 unlike the C-2 can carry an F-35C engine onboard a carrier.

FIGURE 4 CMV-22B CREDIT: US NAVY

And in 2015, I was onboard the USS Wasp when the Osprey brought an engine onboard the ship to support F-35B operations onboard the ship.

This experiment done in 2015 was obviously successful, and not by chance, the US Navy signed its first contract to launch the CMV-22 program the same year.

And perhaps not by chance, a cutting-edge F-35B pilot is now head of the Osprey program at Pax River.

I Interviewed Colonel Matthew "Squirt" Kelly in his office at Pax River last Fall. In that interview we talked about the state of play for the "Osprey Nation," and the impact of the broadening set of users of the aircraft.

"There is no other air platform that has the breadth of aircraft laydown across the world than does the V-22.

"And now that breadth is expanding with the inclusion of the carrier fleet and the Japanese.

"We currently have a sustainment system which works but we need to make it better in terms of supporting global operations.

"With the US Navy onboard to operate the Osprey as well, we will see greater momentum to improve the supply chain."

Then Lt. Col. Kelly after landing onboard the USS Wasp with his F-35B. Credit Photo: Second Line of Defense

And during my visit to Amarillo, a key point about the reach of Osprey Nation and the nature of the community supporting it was driven home to me.

During the visit to the Final Assembly line, Japanese Ospreys were being prepared for delivery to the Japanese military.

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In 2015 when the Japanese Ministry of Defence was preparing for the transformation of its defense force to deal with the new challenges in the region, they released a video in which they showed how Japan would enhance its capability to defend its perimeter.

Yet the Japanese had not yet committed to buying Osprey.

And underlying that final assembly line where I saw the Japanese Ospreys being built for delivery was the highly skilled worked force working in that Bell factory.

As one navy speaker noted at the ceremony: "I would like to first acknowledge the artisans that put this fine machine together. I visited the Bell factory on Wednesday and had a brief walk through of this factory yesterday. This is an incredibly complex machine that you have built and I am in awe of your precise talent and even more inspired by the magic that makes it fly."

By chance, the Mayor of Amarillo, Ginger Nelson, sat next to me at the ceremony and graciously agreed to meet with me later that afternoon at her office.

I asked her directly: "Why Amarillo?"

She answered that we are community committed to excellence and to training workers both responsible to deliver quality and to train those workers.

She noted that the local government and community colleges were working to shape training opportunities for local residents to be able to support the Bell operation as well as the agricultural industry in the area.

"Our values and are commitments to excellence are at the heart of what the Amarillo community is all about," she said.

Going from the delivery to Japan for its latest aircraft to Amarillo, that is what I would call deterrence in depth.

And for the Chinese government, I would warn you to not mess with Texas.

THE FUTURE IS NOW: THE US NAVY, THE KILL WEB AND DEALING WITH PUTIN'S CHALLENGE

03/15/2019

By Ed Timperlake

President Putin has just given all in America a wakeup call, but to the Russian Military everlasting regret if combat ever breaks out the US Navy is always ready-NOW.

Over fifty years ago, 1965, in Bancroft Hall at the United States Naval Academy, Plebes (freshmen) were required when making a very loud announcement to a gathering of fellow Midshipman to begin with the alert: "attention world, attention world."

It was a time at Annapolis when some of those who had fought WWII in the great "Big Blue Blanket" war winning con-ops were still in uniform, several of the Navy Pilots who were featured in the great work "the Bridges of Toko-Ri" were still in uniform, and Vietnam Yankee and Dixie station Carriers were beginning to fight that war.

From Plebe to Four Star Admirals, all in the United States Navy and Marine Corps were constantly engaged and challenged in understanding and mastering the dynamic nature of war at sea and the role of Navy/Marine power projection from across the beach.

In those days sailors still in uniform wearing the Dolphins of the "silent service," the Navy Submarine Community, would proudly point out that with the loss of 52 subs "still on patrol" that their community sunk over 50% of the tonnage of the Imperial Japanese Navy in WWII.

All Navy commanders have to practice over and over to evolve a much broader scope of understanding and direction in this 21st Century information world.

It is a 21st Century challenge to understand the dynamic learning from a computer-human interface while also recognizing it is the goal of a reactive enemy to attempt to destroy not only individual platforms, sink ships and subs and shoot down aircraft, but wreck the very synapses of all things command and control.

Information assurance with redundancy and reliability is critical but also the ability to act independently as systems are degraded to fight and win cannot be forgotten in all training exercises.

The enemy always gets a vote but so does the United States Navy.

The decade ahead is not a repeat of the past 15 years; it is not about a continuation of the land-centric and counter-insurgency slow motion war.

ASW platforms which can operate in an interconnected manner are the crucial ones to build, deploy and sustain in the period ahead, versus those which are very limited in their capability to provide synergy to joint or coalition forces in the battle space.

This means as well that force packages need to be examined, less in and of themselves terms, than in terms of their synergy and capabilities in shaping dominant combat power in the interconnected battle space.

In a lasting reminder to anyone who threatens America from the sea there is a monument at the sea wall at the US Naval Academy, of those "Still on Patrol," the names of lost Submarines from a fading war that are ever within the ethos of the fighting courage of sailors in today's Silent Service.

Courage does run deep.

Bluntly put, an overemphasis on sensing of hypersonic missiles from space really misses the point — it is not about being alert to what is about to kill you — it is about killing the archer and the arrow.

And we have in our hands the means to do so as we knit together key platforms which are delivering the S cubed revolution.

The future is now and working enhanced integrative capabilities moving forward with the new platforms and the relevant legacy ones is a core priority; not preparing for a new space world in 2035.

21ST CENTURY ANTI-SUBMARINE CAPABILITY AS A KEY ELEMENT FOR SHAPING ESCALATION DOMINANCE

03/05/2019

By Ed Timperlake

Second Line of Defense

The famous battle winning lineage of the Navy's Anti-submarine force (ASW) is being called to "Sound General Quarters Battle Stations" because America is being directly threatened by the President of Russia's submarines with low flying air-breathing nuclear tipped hypersonic cruise missiles.

The significant change in the direct threat to the United States which the Trump Administration has highlighted in last year's National Security strategy was presaged by the NORAD/NORTHCOM Commander Admiral Bill Gortney, a clear embodiment of the fighting navy, in our 2016 interview with him in his office at Colorado Springs.

Question: The Russians are not the Soviets, but they are generating new capabilities, which clearly provide a need to rethink homeland defense.

How would you characterize the Russian dynamic?

Answer: With the emergence of the new Russia, they are developing a qualitatively better military than the quantitative military that they had in the Soviet Union.

They have a doctrine to support that wholly government doctrine. And you're seeing that doctrine in military capability being employed in the Ukraine and in Syria.

For example, the Russians are evolving their long-range aviation and at sea capabilities. They are fielding and employing precision-guided cruise missiles from the air, from ships and from submarines.

Their new cruise missiles can be launched from Bears and Blackjacks and they went from development to testing by use in Syria. It achieved initial operating capability based on a shot from a deployed force.

The Kh-101 and 102 were in development, not testing, so they used combat shots as "tests," which means that their capability for technological "surprise" is significant as well, as their force evolves.

Figure 5 This is a notional rendering of the 10 and 2 O'Clock challenge. It is credited to Second Line of Defense and not in any way an official rendering by any agency of the US government. It is meant for illustration purposes only.

The air and sea-launched cruise missiles can carry conventional or nuclear warheads, and what this means is that a "tactical" weapon can have strategic effect with regard to North America.

Today, they can launch from their air bases over Russia and reach into North American territory.

The challenge is that, when launched, we are catching arrows, but we are not going after the archers.

The archers do not have to leave Russia in order to range our homeland.

And with the augmentation of the firepower of their submarine force, the question of the state of our anti-submarine warfare capabilities is clearly raised by in the North Atlantic and the Northern Pacific waters.

What this means for NORAD as well is that limiting it to air defense limits our ability to deal with the multi-domain threat.

It is an air and maritime threat and you need to go on that tack and defense through multiple domains, not simply the classic air battle.

The NORAD Commander was clearly anticipating the core requirement for an air-sea integrated force to deal with the evolving Russian challenge, including the nuclear one.

Clearly, a key element of shaping an effective warfighting/deterrent force is the evolving U.S. and allied anti-submarine capability.

And it is not just about history but a key element of the training and combat development dynamics of the kill web navy.

The ASW community like their fellow combat Naval Aviators and their SEAL team partners, have been day-in and day out 24/7 "training, training. training."

And as we have seen at warfighting centers like Navy Fallon or at Jax Navy where the P-8 has been stood up, training encompasses the dynamics of change for concepts of operations to defeat an enemy fleet.

A key dynamic of change is how the Navy is working surface fleet and air integration to extend the reach and lethality of the fleet and to expand kill web capabilities of the ASW force.

During our visit to Fallon in 2017, Admiral "Hyfi" Harris highlighted the key development and evolving capability:

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. 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.
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"Admiral Rowden talks about distributed lethality and they are getting there rapidly.

And the addition of the Triton unmanned system as well as the new P-8s are part of an enhanced airborne detection and strike capability against enemy submarines.

The Navy and several allies are replacing the venerable P-3 with a dyad, the P-8 and the Triton.

During a visit to Jax Navy in 2016, the ASW community there shared their perspectives on the way ahead, which underscored the evolving kill web approach facing Russian submarines seeking to execute the nuclear mission described by President Putin.

Or put in other terms, the Russian President needs to realize that he is not fighting the US Navy of the Cold War years; he is facing a kill web enabled US Navy able to leverage a variety of assets to destroy his maritime assets.

In this sense, we are the reactive enemy against Putin's declaratory strategy and arms buildup.

IN THE FOOTSTEPS OF ADMIRAL NIMITZ: VADM MILLER AND HIS TEAM FOCUSED ON 21ST CENTURY "TRAINING"

10/12/2019

By Robbin Laird

As Admiral Nimitz confronted the last century's challenges in the Pacific, he concluded a core lesson for this century's Pacific warriors:

"Having confronted the Imperial Japanese Navy's skill, energy, persistence, and courage, Nimitz identified the key to victory: 'training, TRAINING and M-O-R-E T-R-A-I-N-I-N-G.' as quoted in Neptune's Inferno, The U.S. Navy at Guadalcanal (James D. Hornfischer)"

The US and its core allies are shaping new capabilities to deal with the various threats and challenges in the Pacific in the time of the Asian century.

Flexibility in operations and agility in inserting force with a proper calibration of effect will be enhanced as new systems come on line in the years ahead. But these systems will have the proper effect only in the hands of skilled warriors.

https://sldinfo.com/2014/03/the-rise-of-pacific-warriors-training-for-21st-century-joint-and-coalition-operations/

Recently, I visited Naval Air Station, North Island, in San Diego, to meet with VADM Miller, Commander Naval Air Forces, or the "Air Boss" of the US Navy.

Joining the discussion was the F-35 US Navy Wing Commander, Captain Max McCoy.

We discussed the evolution of the Naval Air Wings in the context of the Navy working what we have called in the past "the kill web," or what I am now referring to as building an integrated distributed force.

VADM Miller started by underscoring that significant change is underway for the carrier air wing or CAG.

The F-35 is providing a forcing function of change.

According to VADM Miller:

"5th generation capability is a catalyst for change: how we fight, how we train, how we maintain and sustain aircraft, how we flight test, and how man our squadrons (pilots & maintenance personnel).

"The emphasis is interoperability, networking, distributed forces, and integration."

But several new capabilities are being introduced into the operational force, such as the Triton, P-8s, modernized Super Hornets, the new Hawkeye, the MQ-25 unmanned tanker.

These new capabilities are being worked into an evolving Naval strike force to shape new capabilities for the carrier and for the distributed force.

The new Commandant of the USMC has highlighted how he sees the evolution of the USN-USMC team to shape a distributed offensive defensive capability and the changes described by the Commandant along with changes to the carrier force are adding up to a significant trajectory of change for the sea-based force.

I asked him what are his top funding priorities and he underscored the key challenge of sustainment and getting the force fully supported for its demanding global deployment challenges.

But along with sustainment he highlighted the key challenge of shaping a new approach to training and testing in which the force evolves more rapidly in its combat learning skills from the standpoint of force interoperability.

The training function is changing dramatically, and in many ways, the reality underlying the function is changing dramatically as the capabilities and the focus on what I would call shaping an integrated distributed force change as well.

Captain Max McCoy highlighted what one might call the forcing function of the F-35 and of the F-35 aviators upon the training dynamic.

"We are teaching F-35C pilots to be wingmen, but training them to think like mission commanders.

"F-35C provides more situational awareness than ever before and pilots must be able to influence the battlespace both kinetically and non-kinetically.

"The pilot must interpret cockpit information and determine the best means to ensure mission success either through his own actions or by networking to a distributed force."

They need to think like mission commanders, in which they are operating in terms of both leveraging and contributing to the networked force.

This means that the skill sets being learned are not the classic TTPs for a combat pilot but are focused on learning how to empower and leverage an integrated force.

"Training can no longer focus solely on T/M/S capabilities.

"Training has to develop young aviators who appreciate their role within a larger maneuver/combat element.

"Specifically, how does F-35C complement 4th generation capabilities within the Carrier Air Wing and surface combatants distributed within the Carrier Strike Group?

"It is no longer about fighting as a section or division of fighter aircraft.

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"We only win if we fight as an interoperable, networked, and distributed force.

"We are still learning and incorporating 5th generation capability into the Navy.

"Our efforts must be calculated and measured but push beyond historical comfort zones.

"We must embrace what is new and redefine what is basic warfighting capability.

"This starts with the Fleet Replacement Squadron (FRS) and Air Combat Training Continuum (ACTC) syllabi.

"We must make integrated training a key component of a pilot's progression from FRS graduate to mission commander. F-35C is an enabler, if and only if, we train our pilots to think well beyond the limits of their cockpit and reach of an individual aircraft's weapons system".

They are learning how to operate as distributed force packages.

This is leading to radical disjunctures from traditional training approaches and thinking.

How do you best train your aviators to tap into networks and provide for distributed strike?

In shifting from a training focus on traditional TTPs, how do Naval aviator's problem solve differently?

How to reshape effectively the infrastructure to support new training approaches?

How do Naval aviators integrate with and maximize their impact for and on the combat force?

Live Virtual Constructive Training provides a technological path, but is a necessary but not sufficient tool set for the Navy to get where they need to go.

Training is now about shaping domain knowledge for the operational force to ensure that "we can be as good as we can be all of the time."

According to Vice Admiral Miller and Captain McCoy:

"The ability to reshape training and change culture requires a warfighting community to break from traditional training methods either on the range, at sea and in the simulated environment.

"There are numerous reasons why we must find a new balance among live, virtual and constructive (LVC) training in a distributed mission training (DMT) construct.

"Range infrastructure, threat simulation, cost to operate, and security are driving us to search for new training opportunities.

"However, the most important reason is operational readiness – warfighting first.

"We must be ready and prepared to fight at all times independent of FRTP/OFRP phase. LVC/DMT is the only way to be good all of the time given a unit's resourcing that includes manpower, aircraft, and flight hour budget.

"It forces integration among 4th and 5th generation aircraft while also providing the medium to integrate with surface combatants.

"Again, in the future, we are all wingmen in the battlespace who must think well beyond the cockpit or bridge of our platforms. LVC/DMT will be the proving ground that unlocks how we think and encourages TTP

development that would otherwise be hindered by fiscal constraints and under-resourced or inadequate ranges.

"It is the bridge that builds cooperation and cohesiveness among communities. LVC/DMT is the common ground that teaches our amazing tacticians how to appreciate a wide range of capabilities that are far more effective in the collective."

If Admiral Nimitz would visit Naval Air Station, North Island, today, he would be amazed and pleased to see the technology in the hands and coming into the hands of the Naval aviation community.

But he certainly would wish to see the 21st century re-set of training underway to be fully supported and funded.

THE USMC SHAPES A WAY AHEAD: THE PERSPECTIVE OF THE COMMANDING OFFICER OF MAWTS-1

06/01/2018

By Robbin Laird

MAWTS-1 plays a unique role within the USMC and in the joint force.

In our book on the reshaping of Pacific strategy and the role of new technologies and concepts of operations, we highlighted the role of the warfighting centers in the development and evolution of US forces, for which MAWTS-1 has played a key role with the Marines first introducing Ospreys and then F-35s into the warfighting force.

MAWTS pilots and trainers are looking at the impact of V-22 and F-35 on the changes in tactics and training generated by the new aircraft. MAWTS is taking a much older curriculum and adjusting it to the realities of the impact of the V-22 and the anticipated impacts of the F-35.

MAWTS is highly interactive with the various centers of excellence in shaping F-35 transition such as Nellis AFB, Eglin AFB, the Navy/ Marine test community at Pax River, Maryland, and with the United Kingdom.

In fact, the advantage of having a common fleet will be to provide for significant advances in cross-service training and CONOPS evolutions.

Additionally, the fact that MAWTS is studying the way the USAF trains combat pilots to be effective flying the F-22 in shaping the Marine F-35B Training and Readiness Manual is a testimony to a joint-service approach.

This is all extremely important in how MAWTS is addressing the future.

An emerging approach may well be to take functions and then to redesign the curriculum around those functions.

What we forecast in our book is certainly happening.

During a visit to Yuma Marine Corps Air Station in May 2018, I had a chance to discuss the recent experience of Marines shaping and participating in the latest warfighting exercise or WTI Course.

The course is a seven-week training event hosted by the squadron's cadre. The squadron provides standardized tactical training and certification of unit instructor qualifications to support Marine aviation training and readiness and assists in developing and employing aviation weapons and tactics.

Second Line of Defense

The role of the WTI was described in an article by Sgt. Sarah Fiocco and published on April 21, 2015 as follows:

In a seven-week period, the cost of sending one Marine through Weapons and Tactics Instructors course is comparable to the cost of a four-year education at an Ivy League university.

Sponsored by Marine Aviation Weapons and Tactics Squadron 1, the cost to graduate one certified weapons and tactics instructor from the course is $200,000. A cost, which puts each candidate through a full range of advanced aviation operations.

The course serves to train the best pilots in the Marine Corps to return to their units as training experts. This process requires countless hours from the MAWTS-1 instructors and staff to ensure they are sending exceptionally-trained WTIs back to the fleet Marine force.

"These students will be the people, who the commanding officer looks to when it comes to handling the training plan of an entire squadron," said the Academic Department Head, WTI, MAWTS-1. "He looks at them to be the guy, who says, 'We're good to go to combat.'

"He's the guy the CO will trust."

Before pilots can even attend the advanced course, they must fulfill a slew of prerequisite certifications, to include low-altitude tactics instructor and air combat tactics instructor. Pilots achieve most of these certifications from their units, building their experience base in order to qualify them for the WTI course.

"These pilots are already instructors before they come out here," the Academic Department Head said. "We also go see these Marines fly three to six times a year before they come to WTI.

"We can say, based off our experience, if a Marine we observed is ready to go to WTI, or if they need to work on something."

On the first day of class, the pilots receive a 50-question inventory test. This is followed by nearly two months of classroom instruction, flight simulators and piloting training flights on their specific aircraft.

The course begins with instruction exclusive to each student's aircraft then expands to advance training that incorporates other platforms and units.

The students will graduate as experts on their particular aircraft, with the knowledge of how to plan and how to train others. These skills acquired from the course will ultimately be applied to their fleet units and Marine Corps operations as part of the Marine Air Ground Task Force.

"During the final exercise, everyone is working together. From close air support, to battalion lifts, the whole MAGTF is involved," the Academic Department Head said. "When we get to that final exercise in WTI, it's all on the students. They know how to put together a plan and execute, so we are sitting back for the most part just being safety backstops."

Much like the selection process for the students, the staff is selected for the high-level of expertise they bring to course. WTI instructors' contribution to training and standardization of coursework is what makes WTI the valuable asset it is to the Marine Corps.

"All the instructors, who teach here are handpicked," the Academic Department Head said. "We do everything we can to ensure the fleet is getting back the best instructors possible."

The Weapons and Tactics Instructor Course is a seven-week course consisting of advanced tactical aviation training designed to produce weapons and tactics instructors.

The course will serve in key training officer billets to act as a training expert in the fleet, ensuring that Marine aviation units continue to train effectively and to a standard across the Marine Corps. It is courses like WTI, which reinforce the Marine Corps' role as our nation's force in readiness.

WTI has become especially significant as the Marines are going through the strategic shift from a predominant counter-insurgency and stability operations period of warfare to preparing for higher-intensity, peer-to-peer conflict.

It means as well that crisis management in a counter-insurgency operation is clearly different from those involving higher levels of conflict and potentially including peer competitors.

And as the Marines have already introduced the F-35 into the MAGTF and are adding the CH-53K and other new capabilities, there is a clearly a shaping and learning process underway for the USMC and the joint force.

MAWTS-1 is clearly at the center of this process.

During this visit, I had a chance to talk with the outgoing CO of MAWTS, Col. Jim Wellons about his time at MAWTS.

We have talked before during his time at MAWTS and those interviews as well as follow-ons can be read here:

https://sldinfo.com/2016/12/the-way-ahead-for-usmc-con-ops-the-perspective-of-col-wellons-co-of-mawts-1/

https://sldinfo.com/2017/11/evolving-the-capabilities-of-the-magtf-the-case-study-of-the-f-35-and-himars/

https://sldinfo.com/2017/11/an-overview-on-wti-1-18/

With the coming of the F-35, the Marines have led the way at the outset for the US services which has meant that the Marines have been working closely with the USAF as that service brings its F-35s into initial operating capabilities.

According to Col. Wellons: "We have always had a close relationship with the US Navy.

"We are after all Naval aviators.

"I cannot over-emphasize our close working relationship with the US Navy and Top Gun, where we have always had several USMC aviators filling highly sought-after exchange tours.

"We have some challenges but also many opportunities.

"Top Gun has a strong emphasis on Super Hornet and are just beginning to roll out their F-35C course, which we intend to support.

"We have legacy F/A-18s but do not fly the Super Hornet and the USMC has been leaning forward on the establishment of the full spectrum of F-35 tactics, having already executed five WTI classes with the F-35B.

Second Line of Defense

"Recently we have made huge strides in establishing ASLA joint communications standards and we are closer now than ever before to aligning all the service standards with joint communications – all the service weapons schools have been cooperating in this effort.

"With regard to working with the USAF — over the past decade, as we operated together during the wars in Iraq and Afghanistan, we became much closer and better integrated across the service weapons schools.

"But the advent of the F-35 has really accelerated our close working relationship with the USAF.

"The standup of F-35 was "joint" from the very beginning, and the USMC has been aggressive with the stand up of our operational F-35s – the first of all the services to declare IOC, deploy overseas, and conduct weapons school courses with the F-35.

"As a result, we have been at the forefront of lessons-learned with the aircraft in terms of sustainment, deployability, expeditionary operations and tactical employment."

"We currently have a former USMC F/A-18 instructor pilot flying F-35As on an exchange tour with the USAF Weapons School, and we will soon have the first USAF F-35 exchange pilot coming to Yuma for a tour as instructor pilot in the F-35 division at MAWTS-1.

"We are all learning about employing, supporting and sustaining the F-35, and deploying it to places like the Western Pacific, where VMF-121 has been in place now a year."

Question: During my time in Australia earlier this year, the Commander of the 11thAir Force raised a key question about the need for the USAF to ramp up its mobile basing capabilities.

How has the USAF interacted with the Marines at Yuma with regard to working through a new approach?

Col. Wellons: "Within the USMC, expeditionary operations are our bread and butter. In a contested environment, we will need to operate for hours at a base rather than weeks or months.

"At WTI we are working hard on mobile basing and, with the F-35, we are taking particular advantage of every opportunity to do distributed STOVL operations.

"It is a work in progress but at the heart of our DNA.

"We will fly an Osprey or C-130 to a FOB, bring in the F-35s, refuel them and load them with weapons while the engines are still running, and then depart. In a very short period of time, we are taking off with a full load of fuel and weapons, and the Ospreys and/or C-130s follow close behind.

"We are constantly working on solutions to speed up the process, like faster fuel-flow rates, and hasty maintenance in such situations.

"Of course, we have operated off of ships with our F-35s from the beginning, and that is certainly an expeditionary basing platform.

"We have been pleased with what we have seen so far in regard to F-35 readiness at WTI.

"For example, in the last WTI class we had six F-35s and we had five out of six up every day, which was certainly as good as anything we have seen with legacy aircraft.

"During the most recent class, F-35s supported us with over 95 sorties and a negligible cancellation rate.

"Our readiness rates at WTI are not representative of the fleet, where we continue to work on enhancing overall readiness goals with F-35."

We then discussed the F-35 and USMC operations beyond MAWTS-1.

Col. Wellons: "This is still an early variant of this airplane.

"It is the early days for the F-35 and we are working things like software evolution.

"Yet the aircraft has already had an impact in the PACOM AOR.

"We can put this airplane anywhere in the world, sustain it and fly it and get a key deterrent impact, as we have already begun to see."

Question: Looking back at your two and half years in command at MAWTS-1, what are some of your thoughts about the dynamics of change which you have seen while here?

Col. Wellons: "When I came here, the squadron was in great shape. I had the impression that what I needed to do was to focus on trying to sustain the standard of excellence that had already been established, because the squadron was really firing on all cylinders.

"I felt we were training at a world-class level and were training to the appropriate skills.

"But during my first year we faced dramatic and significant readiness challenges across Marine aviation, almost at an historic level.

"This led to significant reductions in the level of pilot proficiency and material readiness, and challenged our ability to meet training objectives during WTI."

"The readiness cratering also impacted morale and placed our staff in a difficult position. If you have students that are coming to WTI that are barely qualified, who have just barely achieved the prerequisites necessary to come to a WTI class, that creates a risk management problem and makes it difficult to train at the graduate level.

"We were looking at dips in proficiency from flying 15-20 hours a month down to 10 or 11 hours a month or lower, and this required us to make some substantial adjustments to how we approached and ran the WTI class.

"Fortunately, this situation has dramatically changed for the better.

"During this last WTI course we had the highest level of readiness that I think we have ever seen for our fixed wing fleet, and our pilots are back above 20 hours a month across all communities.

"I would caution that we view this readiness recovery as fragile at this point, but it is definitely headed in the right direction."

Question: Clearly, there is a strategic shift underway for US and allied forces to now operate in contested environments. That has happened during your time here.

How has that affected what you have had MAWTS-1 focus upon?

Col. Wellons: The team at 29 Palms as well as at Yuma have ramped up the contested and degraded environment that we present to our training audience at WTI and across all the other service level MAGTF training venues.

"We have challenged our students, especially this year, to operate in environments where communications and navigation systems are challenged, facing the most sophisticated and capable adversaries we can find.

"We focused on the idea that in the future fight our primary means of navigation and communication will probably be denied, and certainly degraded and our operators may have to use old fashioned techniques to get bombs on target."

Question: You are clearly working what might be called F-35 2.0 while flushing out the dynamics of 1.0.

And one key area where that is happening is with regard to the sensor-shooter relationship.

We talked last year about this dynamic, what has been happening since then?

Col. Wellons: In part, it is about the transformation of the amphibious fleet whereby the shipboard strike systems or sensor systems can work with the reach of the F-35 as a fleet.

"For example, we see clear interest from the Navy's side in exploiting 5th generation capabilities in the amphibious fleet using the Up-Gunned ESG, that will better leverage the capability they have got with the F-35.

"Naval integration will be a major line of effort in the WTI course going forward."

"The F-35 is leading to a fundamental reworking of where we can take the sensor-shooter relationship.

"We tend to focus on the airplane's sensor and how that sensor can go out and find a target and employ its own ordinance on that target.

"That is certainly something which the F-35 can do.

"But it can also enable an off-board shot, as in the case of HIMARS/F-35 integration.

"Or it can work with the G/ATOR radar on the ship or the ground to enable weapons solutions for other platforms in the distributed battlespace.

"It then becomes a question of how do I maximize the number of targets I can hit with the F-35 distributed force rather than how many targets can an individual fighter hit."

"This is part of the combat learning we are working on at MAWTS-1 as well."

Question: Assuming readiness remains at an appropriate level, what challenges do you see in the near term with regard to training?

Col. Wellons: Clearly, a major challenge we face is the limitations of our training ranges.

"We need to expand the potential of tasks we can do on these ranges to replicate a realistic and lethal contested environment.

"This is another consequence of our budget challenges in recent years, and we are pushing hard for upgrades of all our emitters, target sets, and simulation capability in order to enable full spectrum training at the high end."

NAWDC AND SHAPING A 21ST CENTURY COMBAT FORCE: THE PERSPECTIVE OF ADMIRAL "HYFI" HARRIS

08/15/2017

2017-08-09 By Robbin Laird and Ed Timperlake

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.

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

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.

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.

Second Line of Defense

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.

"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.

"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 Line of Defense

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.

"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.

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?

Second Line of Defense

"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.

"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.

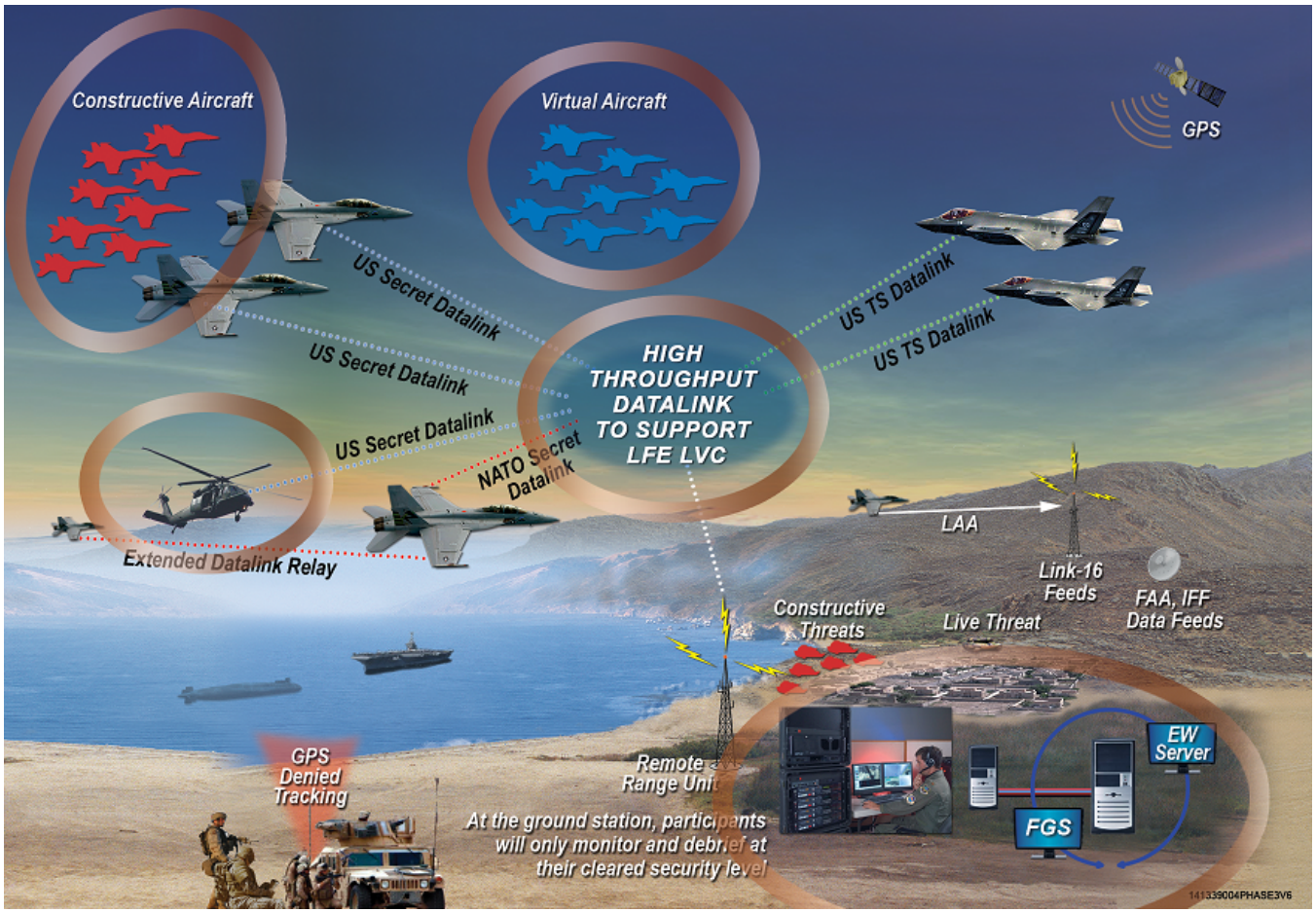

Figure 6 Live Virtual Constructive Training

"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.

Second Line of Defense

"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."

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.

VISITING THE INTEGRATED TRAINING CENTER AT NAVY JAX: SHAPING THE WAY AHEAD FOR THE NEW NAVY COMBAT TEAM OPERATING P-8S AND TRITON

06/02/2016

2016-05-29 By Ed Timperlake and Robbin Laird

The great historian Max Hastings in a seminal book about all the fighting forces of World War II said that after some very nasty setbacks early in the war, the US and Royal Navies emerged as the most effective fighting forces in the war.

http://www.nytimes.com/2011/11/20/books/review/inferno-the-world-at-war-1939-1945-by-max-hastings-book-review.html?_r=0

We have often spoken of the US Navy's combat operational goal in WW II of creating a Big Blue Blanket over the Pacific via a vast deployed fleet.

This now evolved into a "Big Blue 'Tron' Blanket.

https://sldinfo.com/wp-content/uploads/2014/11/21st-Century-Approach-to-Tron-Warfare.pdf

But what also can never be forgotten is the other war winning combat approach; the USN and RN Hunter-Killer teams of air and surface platforms working in harmony to win "The Battle of The Atlantic."

In today's 21s Century military world add in nuc attack subs, satellites and "remotes" and todays "Big Blue 'Tron' Blanket" and "Hunter-Killer Teams" now become global scalable "Kill Webs."

When we visited Navy Jax, we were able to talk with those creating an effective response to the challenges highlighted by Admiral Gortney, namely the P-8/Triton community.

These maritime war fighting assets are key elements in the evolving approach to crate effective "kill webs" to address a very real and growing threat to North America.

And an important asset in shaping this way ahead is provided by the Maritime Patrol and Reconnaissance Weapons School (MPRWS) located in the Integrated Training Center.

In effect, this is where the Weapons and Tactics Instructors are being trained and shaped to win the tron wars being fought at 10 and 2 O'clock.

The training and successful use of all technology is ongoing a ensure that air-maritime force has both timely information, appropriate weapon technology and the appropriate level of decision con-ops it needs to deal with evolving threats.

We had a chance to interview Lt. Commander "KC" Campbell, the Weapons and Tactics Department Head, during our visit to the ITC.

http://www.navy.mil/submit/display.asp?story_id=52596

http://www.navy.mil/submit/display.asp?story_id=77993

Obviously, the major challenge facing the ITC is implementing the transition from P-3 to P-8/Triton.

Half of the squadrons have transitioned but that leaves another half to go.

But Lt. Commander Campbell is not taking his eye off of the ball of shaping a transformation approach as the new capability comes into the fleet.

He emphasized that the capability was new and there was a need to shape new tactics for the new capability.

He fully recognized the dynamic iterative nature of his mission.

For example, the P-3 flew to an area of interest and then went on station.

"With the P-8 when we take off, we are already in the area of interest.

We already have a tactical picture from the Mobile Tactical Operations Center and we are already working within and on the common operating picture.

This is a change in capability; and needs a change in approach."

The new capability especially as the USN-USMC team works towards enhanced capabilities in the extended battlespace requires shaping new techniques, new tactics and changing the mental furniture of the entire warfighting community.

To do this, Navy Jax deploys personnel from Jax to the fleet to interactively reshape thinking.

"I have a team of about 25 junior officers who spread out from Jax to the fleet and shape training nodes.

They make sure common tactics are implemented and standardized across the fleet."

And in the process, of course, the fleet interacts with the P-8/Triton community to reshape concepts of operations going forward.

Second Line of Defense

"There are cross-functional teams throughout the fleet which are working the evolution of tactics."

Fallon Air Station is one key piece of the training effort where Jax sends instructors.

"In effect, a university structure is emerging at Fallon to look to integrate the new technologies, platforms and approaches in the shaping and application of new tactics."

P-8 has been to Red Flag and is starting its migration into the joint and combined world as well.

And twice a year there is a weapons and tactics course.

Of course, there is always feedback on the effectiveness of tactics, techniques, and Procedures (TTPs) from the Fleet and then assure that operational improvements are standardized and then go back out to the squadrons.

In effect, the P-8/Triton team is shaping a common approach or "theory" of ISR and C2 applied to the extended battlespace; and the two platforms are the applications of the theory.

In short, the USN is positioning itself for an innovative way ahead that is neither "manned or unmanned" but synergistically working through how new systems can work with one another to deliver the desired outcome or effect in the battlespace, notably in the ISR, C2 and anti-submarine domains.

Editor's Note: The P-8s are deploying and learning with the Fleet as Lt. Commander Campbell has described.

One example of this deployment and learning cycle was with the Truman battle group last fall.

According to an article by the VP-5 PAO published 10/14/15 in the Jax Air News:

As September drew to a close; so did the Harry S. Truman Composite Training Unit Exercise (COMPTUEX). During the exercise, the "Mad Foxes" of VP-5 and "Fighting Tigers" of VP-8 provided real time support for anti-submarine warfare (ASW), anti-surface warfare (ASuW), and maritime Intelligence Surveillance and Reconnaissance (ISR) to the Carrier Strike Group (CSG) 8.

Patrol Squadron (VP) 5 Commanding Officer Cmdr. Alan D'Jock, stated, "I could not be prouder of the VP-5, VP-8, and Mobile Tactical Operations Center (MTOC-3) "Mad Tiger" team. We look forward to deploying with the Fighting Tigers and continuing our relationship throughout the remainder of our home cycle and next year's deployment."

The VP-5 and VP-8 Mad Tiger team was well prepared for the uncertainties of such a dynamic environment. A contributing factor to the success of the exercise was due to the VP liaison officers (LNOs) aboard Harry S. Truman.

These individuals were led by Cmdr. Alan Miller, executive officer of VP-10 and provided enhanced communication between CSG8 and the maritime patrol reconnaissance aircraft. Each crew was able to adapt to and overcome potential problems that may arise such as formidable weather or simulated hostile contacts.

"The experience that VP-5 and VP-8 garnered from COMPTUEX is invaluable. What our aircrews saw on station is very difficult to duplicate in a simulated training environment," remarked D'Jock.

VP-5 and VP-8 provided 532.8 flight hours from 73 events to the exercise. The squadron's participation was a valuable asset to both the surface forces, as well as to the aircrews in the aircraft.

AWO3 Dymer, an electronics warfare officer with VP-5, said, "Being a part of the exercise was physically and mentally demanding but also taught some of the most senior crews lessons and tips for real world scenarios. It opened the eyes of many new sailors by showing the massive coordination required to accomplish many jobs."

With this exercise complete, Oct. 2, VP-5 and VP-8 continued their training for a successful deployment next year. The Mad Foxes of VP-5 and Fighting Tigers of VP-8 will continue training, and participating in exercises abroad as well as at home.

And as Lt. Commander Campbell noted, the P-8s have started their joint learning engagements in Red Flag.

THE TRANSFORMATION OF THE MARITIME PATROL "AIRCRAFT" ENTERPRISE: THE PERSPECTIVE OF REAR ADMIRAL PETER GARVIN

12/20/2019

By Robbin Laird

Recently, I had the opportunity to visit with Rear Admiral Pete Garvin in his office in Norfolk Virginia to discuss the way ahead with the US Navy's Patrol and Reconnaissance Force (MPRF).

Commander Patrol and Reconnaissance Group / Commander Patrol and Reconnaissance Group Pacific (CPRG/CPRG-PAC) provides oversight to more than 7,000 men and women on both coasts operating the U.S. Navy's maritime patrol aircraft including the P-8A "Poseidon", P-3C "Orion", EP-3 "Aries II" and MQ-4C "Triton" unmanned aircraft system.

The MPRF is organized into two Patrol and Reconnaissance Wings at NAS Jacksonville, Florida, and NAS Whidbey Island, Washington including 14 Patrol and Reconnaissance squadrons, one Fleet Replacement Squadron (FRS) and over 45 subordinate commands. The MPRF is the Navy's premier provider for airborne Anti-Submarine Warfare (ASW), Anti-Surface Warfare (ASuW), and maritime Intelligence, Surveillance, and Reconnaissance (ISR) operations.

We discussed the force transformation currently underway as the foundation for further innovation moving into the future for the maritime force in its global operations. The P-8A and MQ-4C are not simply replacement platforms for the P-3 and EP-3. The change is as dramatic as the Marines going from the CH-46 to an Osprey which could only be described as a process of transformation rather than a transition from older to newer platforms.

It is not simply that these are different platforms, but the question of how to title the article suggests the dynamics of change. These are not merely maritime patrol aircraft but rather a synergistic 'Family of Systems' empowering global maritime domain awareness and the joint strike enterprise.

Most importantly, while the P-8A is a capable engagement platform in its own right, the information generated by the P-8A/MQ-4C dyad empowers and enhances the organic ASW strike capability on the P-8.

Moreover, the entirety of Department of Defenses' strike capability is enhanced against adversarial multi-domain forces.

We hear a lot about the coming of Artificial Intelligence and new sensors to the combat force, but the P-8A and MQ-4C are bringing these capabilities to the force today. With pre-mission planning and post-mission product dissemination supported by a dedicated "TacMobile" ground element, these platforms comprise a solid foundation for the new MDA enterprise. Working together, the weapon systems will deliver decisive

information to the right place at the right time to empower the multi-domain combat force. These systems are designed to be quickly software upgradeable and evolve over time as combat performance, and contact with the adversary, provide significant real-world feedback.

Although these are US Naval platforms, they are designed to connect with the larger C2/ISR infrastructure, changing the capabilities and operations of the entire U.S. and allied combat forces.

With core allies buying P-8 and MQ-4C, this force is truly global.

My visits to Norway, the United Kingdom, and Australia have provided significant opportunities to discuss with those nations, how they are engaged with the United States in recrafting the MDA and strike enterprise.

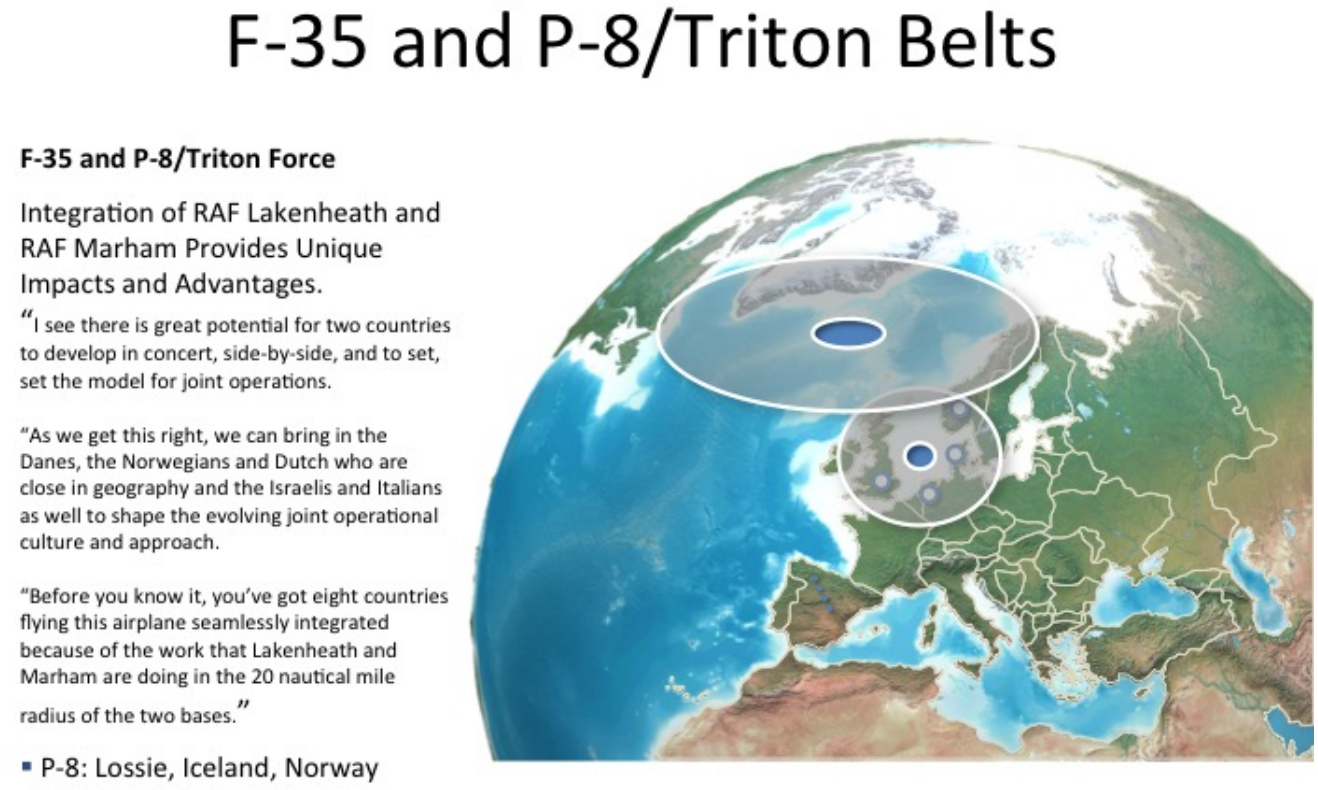

FIGURE 7 BUILDING OUT US AND ALLIED CAPABILITIES FOR THE FOURTH BATTLE OF THE ATLANTIC. CREDIT GRAPHIC: SECOND LINE OF DEFENSE

These platforms provide significant situational awareness for a task force, and can operate in effect as combat clouds for a tailored task force operating across the spectrum of conflict.

At the recent International Fighter Conference 2019, there was significant discussion of the coming of manned and unmanned teaming. There were no naval aviators at the conference but if they had been present, they would have told the conference that the U.S. Navy is already working and improving manned/unmanned teaming concepts and doctrine.

With the coming of Triton, a completely new approach is being shaped on how to operate, and leverage the data and systems onboard the manned and unmanned air systems joined at the hip, namely, the P-8 and the Triton.

There is an obvious return to the anti-submarine mission by the U.S. and allied navies with the growing capabilities of the 21st century authoritarian powers.

However, as adversary submarines evolve, and their impact on warfare becomes even more pronounced, ASW can no longer be considered as a narrow warfighting specialty.

This is reflected in Rear Admiral Garvin's virtuous circle with regard to what he expects from his command, namely, professionalism, agility and lethality.

The professionalism which defines and underpins the force is, in part, about driving the force in new innovative directions. To think and operate differently in the face of an evolving threat. Operational and tactical agility is critical to ensure that the force can deliver the significant combat effect expected from a 21st century maritime reconnaissance and strike force. Finally, it is necessary but insufficient to be able to find and fix an adversary.

The ability to finish must be realized lest we resign ourselves to be mere observers of a problem.

The Australians consider the P-8/Triton force to be part of their fifth-generation transition in that the information being processed and worked by the machines in the dyad and the analysts onboard or ashore is informing assets across the enterprise with regard to threats and resolutions required by the entire combat force.

It is not simply about organic capabilities.

The P-3 flew alone and unafraid; the dyad is flying as part of a wider networked enterprise, and one which can be tailored to a threat, or an area of interest, and can operate as a combat cloud empowering a tailored force designed to achieve the desired combat effects.

The information generated by the 'Family of Systems' can be used with the gray zone forces such as the USCG cutters or the new Australian Offshore Patrol Vessels. The P-8/Triton dyad is a key enabler of full spectrum crisis management operations, which require the kind of force transformation which the P-8/Triton is a key part of delivering the U.S. and core allies.

A key consideration is the growing importance of what one might call "proactive ISR."

It is crucial to study the operational environment and to map anomalies; this provides a powerful baseline from which to prepare future operations, which require force packages that can deliver the desired kinetic or non-kinetic effect.

Moreover, an unambiguous understanding of the environment, including pattern of life and timely recognition of changes in those patterns, serves to inform decision makers earlier and perhaps seek solutions short of kinetic.

This is not about collecting more data for the intelligence community back in the United States; it is about generating operational domain knowledge that can be leveraged rapidly in a crisis and to shape the kind of C2 capabilities which are required in combat at the speed of light.

Second Line of Defense

Historically, a presence force is about what is organically included within that presence force; today we are looking at combat reach or scalability of force.

Faced with limited resources, it is necessary for planners to exercise economy of force by tailoring distributed forces to a specific area of interest for as long as required.

The presence force however small needs to be integrated not just in terms of itself but also in its ability to operate via common C2 or ISR connectors with both allied and U.S. forces. This enhanced capability needs to be forward deployed in order to provide enhanced MDA, lethality and effectiveness appropriate to achieve the desired political/military outcome.

Success rests on a significant rework of C2 networks to allow a distributed force the flexibility to operate not just within a limited geographical area, but reach beyond the geographical boundaries of what the organic presence force is capable of doing by itself.

This is about shaping force domain knowledge well in advance of and in anticipation of events.

This is not classic deterrence – it is pre-crisis and crisis engagement.

This new approach can be expressed in terms of a kill web, that is a U.S. and allied force so scalable and responsive that if an ally executes a presence mission and is threatened by a ramp up of force from a Russia or China, that that presence force can reach back to relevant allies as well as their own force structure in a timely and effective manner.

For this approach to work, there is a clear need for a different kind of C2 and ISR infrastructure to enable the shift in concepts of operations. Indeed, when describing C2 and ISR or various mutations like C4ISR, the early notions of C2 and ISR seen in both air-land battle and in joint support to the land wars, tend to be extended into the discussions of the C2 and ISR infrastructure for the kill web or for force building of the integrated distributed force.

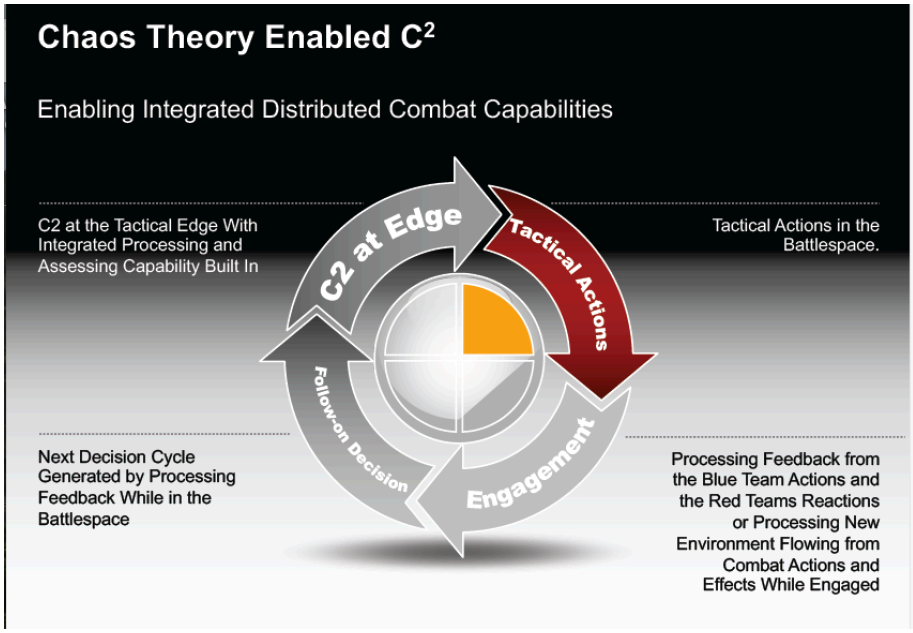

FIGURE 8 A VERY DIFFERENT KIND OF C2 IS BEING BUILT FOR THE INTEGRATED DISTRIBUTED FORCE. CREDIT GRAPHIC: SECOND LINE OF DEFENSE

The P-8/Triton dyad lays a solid foundation for the wide range of innovations we can expect as the integrated distributed force evolves: expanded use of artificial intelligence, acceleration of the speed for software upgradeability, achieving transient combat advantage from more rapid rewriting of software code, an enhanced ability to leverage the weapons enterprise operating from a wide variety of air, ground, and naval platforms (off-boarding), and an ability to expand the capabilities of manned-unmanned teaming as autonomous maritime systems become key elements of the maritime force in the years to come.

In short, the Maritime Patrol and Reconnaissance Force is not simply transitioning, it is transforming.

It is delivering significant new capabilities now, and laying a solid foundation for the future. It is empowering what the Aussies would call a fifth-generation multi-domain combat force.

You can either live in the past and lose ground; or you can lean forward and build out the foundation for the integrated distributed force.

THE ARRIVAL OF TRITON IN THE PACIFIC: NEW MANNED-UNMANNED TEAMING CAPABILITIES AND DELIVERING NEW C2/ISR CAPABILITIES

01/28/2020

FIGURE 9 THE FIRST TWO MQ-4C TRITON UNMANNED AIRCRAFT ARRIVED IN GUAM. CREDIT PHOTO: US NAVY

"The inaugural deployment of Triton UAS brings enhanced capabilities and a broad increase in maritime domain awareness to our forward fleet commanders," Rear Adm. Peter Garvin, the commander of Patrol and Reconnaissance Group, said in a Navy statement.

"VUP-19, the Navy's first dedicated UAS squadron supported by an outstanding NAVAIR (Naval Air Systems Command) and industry team, is superbly trained and ready to provide the persistent ISR coverage the Navy needs."

Second Line of Defense

"The introduction of MQ-4C Triton to the 7th Fleet area of operations expands the reach of the U.S. Navy's maritime patrol and reconnaissance force in the Western Pacific," Capt. Matt Rutherford, the commander of CTF-72, said in the statement.

"Coupling the capabilities of the MQ-4C with the proven performance of P-8, P-3 and EP-3 will enable improved maritime domain awareness in support of regional and national security objectives."

"This significant milestone marks the culmination of years of hard work by the joint team to prepare Triton for overseas operations," Capt. Dan Mackin, the manager of NAVAIR's Persistent Maritime UAS program office, said in a statement. "The fielding of the Navy's premier unmanned aircraft system and its additive, persistent, multi-sensor data collection and real-time dissemination capability will revolutionize the way maritime intelligence, surveillance and reconnaissance is performed."1

Andrew McLaughlin of ADBR noted the event from the Australian perspective and added comments with regard to its importance for Pacific defense.

"The deployment of Triton to Guam brings the system a little closer to Australia and its maritime approaches. The RAAF currently has two MQ-4Cs on order of a requirement for six systems, the first of which is expected to be delivered in 2023.

"RAAF Tritons will be home-based at RAAF Edinburgh near Adelaide, although air vehicles are expected to be forward deployed to RAAF Tindal in the Northern Territory to provide a 'sixth orbit' to neatly complement the five planned deployed locations for the US Navy Tritons. Apart from Guam and Point Mugu, the US Navy also plans to base Tritons at NAS Jacksonville in Florida, the Persian Gulf region, and Sigonella Air Base in Italy."

We have visited the allied bases from which P-8 is being operated in both Europe and in Australia, and have visited Edinburgh where the data management system established there allows for a full-blown focus on manned-unmanned teaming in the maritime domain awareness and ASW area.

What can be missed is that this is a major step forward with regard to real world manned-unmanned teaming in a critical area of combat capability.

As we noted in an article published on 9/27/19:

The Triton unmanned system is a key building block for 21st century maritime operations.

In effect, the Triton provides capabilities similar to a low-earth orbiting system which can serve directly the maritime task force commander.

Indeed, a key dimension of the coming of Triton is to ensure that intelligence communities not consider this their asset but ensure that it is considered an operational asset for the fleet, and as part of the maritime domain awareness 360-degree capabilities for the fleet operating as three dimensional warriors.

After our visit to Jax Navy in 2016, we highlighted the importance of this aspect of the coming of Triton, or more accurately, of the coming of the P-8/Triton dyad to the maritime services.

Another key advantage is shaping domain knowledge of the key geographical areas where the dyad will operate.

"The Poseidon operates from 15-30,000 feet normally; the Triton will operate at 50,000 feet and take a broader view."

The world looks differently at each altitude but by rotating crews, a unique perspective is gained by operating at the different altitudes and with different operational approaches to gain knowledge dominance."

This is an approach for a new generation which "wants choice in their careers, rather than being locked into a single platform."

This is about crew resource management as well. It is about shaping, developing and deploying the right skill to the task.

But the capabilities of the dyad are so good in terms of richness and fidelity of information there is already a tug of war between the intelligence community and the operators.

In an era of distributed lethality or distributed operations in the extended battlespace, the decision makers in the fleet, need the information to inform time-constrained decisions.

The fleet commanders need to make timely decisions; the intelligence community wishes to collect information, first, and inform decision makers later. This structural division will simply not work in the era of distributed decision-making and distributed lethality.

The information-decision cycle has to change to adapt to the technology.

"We need an effective cross-domain solution.

The huge divide between intelligence and operations has to be closed."

Their experience is suggestive that there is a broader need for a very robust discussion on real time actionable intelligence information.

US National Command Authority enforcement of Rules of Engagement (ROE) has had a "good and other" progression over time. The "good" is thoughtful ROEs can save lives from fratricide and friendly fire while still allowing direct and indirect fires to destroy the enemy.

The "other" is what we have quipped is the new OODA loop, an OO-L-DA loop in which L stands lag time in combat tempo for Legal review. But after Navy Jax we came away with concern for what yet again is a roles and mission discussion on the flow of strategic and tactical "Intelligence ROE"

If not addressed and debated early, a template of actionable intelligence information going directly into IC NRO/NSA/NGO and upper echelon commands to be analyzed and disseminated may inhibit combat effectiveness and the decisiveness need to prevail in the contested and extended battlespace.

Time sensitive intel is critical at lower level direct action combat commanders from the Squadron pilots, CAG and Strike Group Commanders. The ROE in the traditional IC formula of "up and out" may not be in harmony with ever evolving speed of light sensor shooter technological advances.

THE SPECIAL PURPOSE MARINE AIR-GROUND TASK FORCE-CRISIS RESPONSE-CENTRAL COMMAND AND CRISIS INTERVENTION: INSERTION INTO THE BAGHDAD EMBASSY CRISIS

01/03/2020

Second Line of Defense

FIGURE 10 SP-MAGTF PREAPRING TO DEPLOY TO US EMBASSY IN IRAQ. CREDIT PHOTO: USMC

The United States along now with the Japanese are the only tiltrotor enabled combat forces in the world.

This unique capability has been the backbone of innovations in distributed operations for the USMC for more than a decade of combat experience.

And the upgrading of the Osprey underway for the USMC and the inclusion of the Osprey now in the carrier aviation force will carry forward further innovations for the tiltrotor enabled combat force.

During a visit to Pax River last Fall, the path to further innovations was highlighted by Colonel "Squirt" Kelly.

Coming from the F-35 program provides Kelly with a leg up in terms of understanding what that aircraft can contribute to the Osprey and how, in turn, the V-22 aircraft needs to be modified to a more useful member of the integrated distributed force.

"With the Marine in the back of the Osprey working with his MAG-Tab (tablet), he or she is able to gain access to information flowing in from other platforms in the battlespace.

"And that is one key aspect of what we are focused on as we rework the program.

"Indeed, we have already done exercises at MAWTS-1 and VMX-1 where the Marine in the back of a V-22 can be looking on his MAG-TAB at a video generated from an H-1 or an F-35 operating in the same battlespace."

And the V-22 working with the F-35 is a key element of being able for the Marine Corps/Navy team to work a Lightening carrier approach whereby an LHD like the USS America can operate a significant number of F-35s with accompanying Ospreys.

And this approach clearly is about changing dramatically the nature of what a Marine Corps assault force looks like as well as the combat effect it can achieve.

This next round of innovation is building on a significant period of innovation driven by the incorporation of the Osprey into the USMC approach to distributed operations.

A key example of which recently landed in the U.S. embassy in Baghdad during the recent embassy crisis.

One can remember 1979 and the inability of the U.S. to get inside the U.S. embassy in Tehran to regain control of its embassy. This time it was different. Not just because it was in Baghdad, but the Osprey enabled CR-Special Purpose MAGTF has been created and operated for a number of years.

We have followed the Osprey from its initial deployments to the Middle East until the most recent innovations.

A clear milestone of change was the creation of an integrated distributed force, the Special Purpose MAGTF Crisis Response.

This force of C-130Js and Ospreys is designed to go rapidly to a crisis point and intervene in time to make a difference.

And it is capable of being integrated into a larger USMC or joint force as the tip of the spear.

It was designed in part to deal with embassy under siege crises but has expanded its envelope of operations.

But the events in Baghdad highlighted a core competence of the force.

Ben Werner highlighted the role of the force in the Baghdad events as follows:

The Pentagon is sending more forces, including roughly 100 Marines, to provide additional security to the U.S. embassy in Baghdad after a mob stormed the compound's main entrance on December 31. 2019.

Marines assigned to Special Purpose Marine Air-Ground Task Force-Crisis Response-Central Command deployed to Baghdad from Kuwait, according to the Pentagon.

Additionally, an infantry battalion from the Immediate Response Force (IRF) of the 82nd Airborne Division are headed to U.S. Central Command, the Pentagon announced following an earlier version of this post.

"Approximately 750 soldiers will deploy to the region immediately, and additional forces from the IRF are prepared to deploy over the next several days," the Pentagon said in a statement.

"This deployment is an appropriate and precautionary action taken in response to increased threat levels against U.S. personnel and facilities, such as we witnessed in Baghdad today."

The protesters included members of the Shia group Kataib Hezbollah militia, according to an NPR report. Group members were protesting recent U.S. military airstrikes on five Hezbollah sites in Iraq and Syria.

A Look Back to the Juba Operation

The standup of the capability has provided a significant innovation for the USMC and for crisis response.

Murielle Delaporte visited the SP-MAGTF based in Spain in 2013, and her discussion with the USMC personnel provides a good sense of the approach to innovation represented by standing up the SP-MAGTF, as well as how tiltrotor capability provided the foundation for the innovation in concepts of operations.

Second Line of Defense

In a 2014 article published in Leatherneck, Murielle Delaporte provided an overview of the Crisis Response unit with a focus on the effort in South Sudan. Interviews conducted in December 2013 at the Morón de la Frontera Air Force Base in Spain, where the SPMAGTF–CR temporarily has been deployed since April 2013.

In the following excerpt taken from the article, the author discusses the Juba Operation.

According to the Commanding Officer of the SP-MAGTF-CR in December 2013, Col. Scott Benedict:

"This force provides new capabilities where there has been a gap," said Col Benedict.

Historically, we would provide this kind of capability of a Marine expeditionary unit [MEU], i.e., the Marine forces that are on ships.

Where there have been some gaps in the coverage of these ships, the Marine Corps created this force and intends to create others like it in order to fill those gaps.

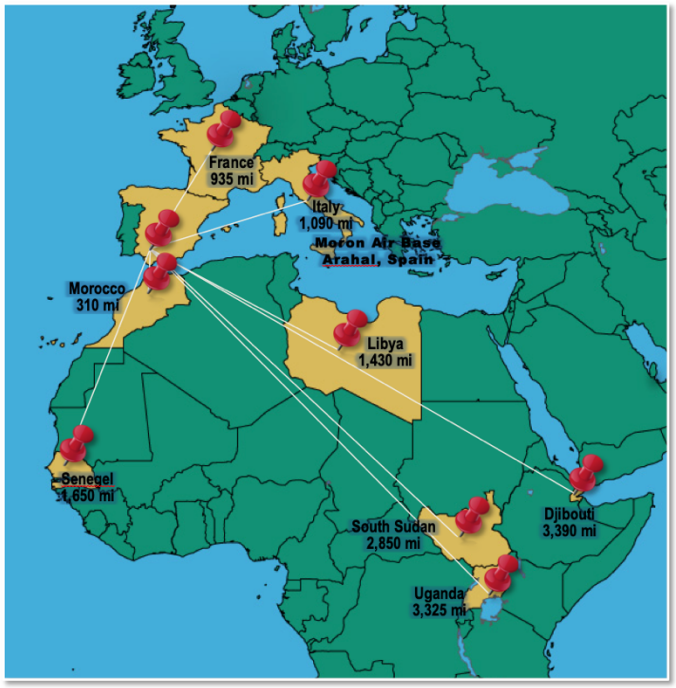

Figure 1 The Operational Reach of SP-MAGTF CR As of Early 2014

FIGURE 11 OPERATIONAL REACH OF SP-MAGTF AS OF EARLY 2014. CREDIT GRAPHIC: SECOND LINE OF DEFENSE

So in that sense, it is a new capability, but the skills that we bring as a SPMAGTF are the same types of skills that Marines have always brought to the fight. In terms of comparing what we are doing now with what we have been doing in the past, my experience over the years has been that this is more the type of missions that Marines have done historically…

However, what we have historically done is operate small units like this and provide very flexible and agile capabilities to respond to crisis. We have done it for years off amphibious shipping, and now we do it with the extended range capability of the V-22 which allows us to provide some very similar capabilities over the vast areas that we are responsible for.

The ACE commander, LtCol Freeland, who has been trained as both a CH-46 and a MV-22 pilot, said there is a paradigm shift due to the juxtaposition of the expeditionary vertical-landing capability of the V-22—

especially useful if a runway or an airfield is not available or if it is necessary to land near the target—and the long legs brought by the KC-130J is able to generate on the theater.

"Both the MV-22 and KC-130J have worked together before in the past, but the way we are teaming them here is a little different: I think one of the best analogies is the tank-infantry team concept," said Freeland.

We now share the whole mission together: It is shared mission management, shared functional responsibilities within the same flight.

Such a change is not overly difficult, but it is different, and we are expanding tactics, techniques and procedures to leverage the unique capabilities of each airframe.

You have, on the one hand, one V-22 aircraft going a distance, a good one but nothing incredible—let's say 350 miles—and land vertically anywhere, and you have, on the other hand, one KC-130J which can fly thousands of miles, but [has] to land on a runway.

Now you put the two of them together, and you can take this team thousands of miles away and land anywhere.

This is a very significant paradigm change.

We bring agility and task organize the Ground Combat Element to go anywhere we need to quickly.

"The work we have been doing traditionally in Africa has been done off amphibious shipping," Col Benedict added.

We would send a ship up and down the coast, and we would operate.

So, this is the same idea that we would not have a permanent presence, but different aircraft.

The capability that we have now is unique, as this pairing of the MV-22 and the KC-130J gives us the type of ranges that is necessary to be able to operate in Southern Europe, while still being able to reach all the operational areas that are necessary in Africa.

That is what I meant by bringing together the old and the new, because when the Marine Corps was envisioning bringing the V-22 forward as a capability, we envisioned this kind of distance to employ the force.

We just have not been [until now] in a position to take advantage or to have to use that capability.

In this particular mission and with this particular force in the area we are responsible for, we are employing the V-22, the KC-130J and a task-organized ground force at the distances we envisioned when this aircraft was designed.

That is revolutionary.

The Marines also are going back to some geographic roots as well, since they have had a long history in West Africa during the Cold War and in the '90s and early 2000s.

Benedict added,

Second Line of Defense

Well before the current 'post 9/11,' it has been episodic because we do exercises and theater security cooperation where we partner with nations, so we learn from them and they learn from us, keeping in mind that we might work together in the future for a common goal.

However, we have not based there.

We have been doing these operations for years, and it has paid dividends when we had to do 'provide support' for different countries on the continent.

Another MAGTF, called SPMAGTF Africa, is, in fact, more dedicated to training and partnering with African forces and has been building those relationships for several years on the continent.

This long-lasting effort has proven an essential part in the success of the recent evacuation of U.S. and non-U.S. citizens from South Sudan, with the ability to rely on neighboring partners such as Uganda, which at the time of the crisis actually was involved in a pre-planned small logistics exercise with SPMAGTF Africa, while USAFRICOM also was overseeing an aircraft mission flying 850 Burundians as peacekeepers in Central Africa.

Juba, South Sudan, also has been a case in point demonstrating the revolutionary capability of the pairing between the MV-22B and the KC-130J with the longest-range insert ever accomplished by the SPMAGTF–CR.

As the domestic situation worsened in South Sudan on Dec. 15, 2013, a decision was made to evacuate part of the personnel from the U.S. Embassy in Juba. The mission was given to USAFRICOM, which assigned its execution to the Combined Joint Task Force-Horn of Africa based in Djibouti. It was under the authority of the CJTF-HOA commander, Brigadier General Terry Ferrel, USA, that on Dec. 22, 2013, SPMAGTF–CR repositioned about a third of its force—160 Marines and sailors—from Morón de la Frontera to Camp Lemonnier, Djibouti.

Approximately 12 hours later, a platoon-size element (about a third of that very force) was flown by a KC-130J to Entebbe, Uganda, in order to be better postured to support operations at the U.S. Embassy in Juba.

"Within 60 hours of receiving the execution order, SPMAGTF–CR inserted forces more than 4,000 nautical miles from Spain to Djibouti, Uganda and South Sudan," said Capt. Sharon Hyland, SPMAGTF–CR public affairs officer.

"The distance from Spain to Djibouti is equivalent to a flight from Anchorage, Alaska, to Miami, Florida. This was the longest-range insert to date for this force and was a testament to the organic aviation assets and our task organized force which enables us to accomplish our mission."

On Jan. 3, 2014, a squad-size element of Marines from SPMAGTF–CR successfully evacuated more than 20 personnel from the U.S. Embassy in Juba, via a KC-130J in coordination with the East African Reaction Force (EARF).

VISITING THE WARLORDS: AN APRIL 2019 UPDATE FROM THE CO OF VMFAT-501

04/29/2019

By Robbin Laird

During my most recent visit to 2ndMarine Air Wing, I had a chance to visit MCAS Beaufort and meet with Lt. Col. Adam Levine, the CO of VMFAT-501, otherwise known as the Warlords.

As the base was busy for the airshow being held the weekend of the 26thof April, the CO graciously provided some time for an update on the USMC training efforts and shaping the pipeline for the training aspect of the fast jet transition in the Marine Corps.

I first dealt with the Marines getting ready for F-35 as Eglin stood up the first training efforts.

My guide to those efforts, was Col. "Turbo" Tomasetti.

Then when the Warlords were first set up at Eglin, the CO was a Marine which I knew from his F-22 flying days, Lt. Col. Berke. The Marines have had a very significant impact on the global standup of the F-35, both because they were the first to IOC the aircraft, and because the kind of integration which the Marines embody is very similar to what the smaller Air Forces of partners and allies seek from their F-35s.

My visit to Lt. Col Berke occurred during a visit of Secretary Wynne to Eglin in 2013.

And Lt. Col. Berke has embodied the impact of the Marines on the partners for he appeared at the Williams Seminar in 2014 in Canberra, Australia which highlighted fifth generation aircraft in the context of Australian defense transformation and then in the 2015 Williams Foundation Seminar in Denmark where the same opportunity to speak and to shape understanding of the fifth gen revolution for allies was highlighted.

FIGURE 12 F-35B FLYING AT BEAUFORT AIR SHOW, APRIL 2019. CREDIT. SECOND LINE OF DEFENSE

Then in 2015, we visited Beaufort shortly after the warlords had transitioned to Beaufort from Eglin.

I later met members of the Warlords onboard the USS Wasp during sea trials.

But I have not been back to Beaufort for four years, and the Marines have been busy ramping up their training efforts during that period.

Lt. Col. Levine provided a comprehensive update on those efforts.

It was obvious from the flight line that more planes, pilots and maintainers were populating the base since I was last there.

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It is also clear from discussions with the CO that Ed Timperlake's forecast that the squadron pilots and the squadrons using the F-35s would drive the process of innovation, not the inside the beltway cubical commandos.

And that innovation is being driven in part by a learning cycle from the operational squadrons back to the training command.

The CO highlighted that as the operational squadrons gained experience in executing the various missions in which the aircraft is involved that operational learning was being brought back to the training effort and providing greater accuracy with regard to the demand side but also the training effort was able to work better training for preparing for operational missions.

The command has obviously scaled up since the last time I was there with more than 100 pilots trained and with the standing up of the second training squadron at Beaufort over the next few months, that scaling up would be accelerated as well.

The challenge is a significant one as the USMC will transition from their legacy force to an all F-35 one within the next two decades and the task of the training squadrons will be to train the "newbies" and the experienced pilots from legacy aircraft to fly and operate the F-35.

The training cycle is eight months during which the pilots learn to fly the new jet and then to take the jet through its paces with regard to variety of missions for which the Marines use their fast jets.

When I was last there, no "newbies" were present; only experienced pilots.

Now the "newbies" are the majority of pilot trainees.

I asked the CO who is an experienced Hornet pilot how the two cohorts experience was different. It must be remembered that heart of fifth gen aviation is a man-machine revolution, where the pilot is getting comfortable with the performance of his aircraft generating data providing situational awareness and the pilot interacting with his screens while operating the aircraft.

He made the point that the "newbies" had never experienced the much more pilot intensive processing of data which legacy pilots do, expected their machines to work in ways that could facilitate what they wanted to do, but to do them faster.

In other words, they already assumed the new baseline of man-machine interaction and wanted that interaction to speed up.

The pilots of legacy pilots had much more appreciation of the fact that the F-35 was working from a very different baseline than their legacy jets did.

The training of the two cohorts was handled a bit differently as the more experienced combat pilots could do more training in the simulators with the "newbies" doing more time in the cockpit.

I wanted to discuss with the CO the challenge of training with regard to a software upgradeable aircraft.

I have discussed this challenge with regard to other software upgradeable aircraft, in Williamtown Airbase with the RAAF and the P-8 with Jax Navy.

Put simply, the advantage of the software upgradeable aircraft is that the historical type/model/series understanding of an aircraft now transitions the type by the software enabled combat systems on board and which variant is onboard the particular aircraft or squadron of aircraft.

This is the concurrency issue, which is built into a software upgrade process, although the defense press has incorrectly only identified this challenge with that of the F-35.

Not a surprise because they IOCd first and to the operational impacts from operating these aircraft in the Pacific and are transitioning their initial 2B software jets to 3F and this transition requires both a hardware and software upgrade.

What this means that the training command will certainly operate the early software versions of the aircraft as the Marines are pushing the 3F version to the operational squadrons.

But what this means is that pilots in the training process need to become familiar with both variants of the aircraft and understand the interaction of the two.

This is not a bad thing because in the operational world they will need to work with aircraft operating globally which are at various software levels, both with regard to services and partners.

Lt Col Levine has been flying the F-35 for more than seven years and has witnessed first-hand the software roadmap taking shape from block 1A through 3F.

He underscored that the evolution onboard the Hornets flown by the Marines compared to flying the early variants of the F-35 did not demonstrate the generational differences which now are evident with the 3F.

“There is simply no comparison between a 3F F-35 and a legacy aircraft.

“They are in different worlds”

The Marines at Beaufort have and are working closely with allies.

The Brits stood up their training at Beaufort and have jets, pilots and maintainers working with the squadron until this summer.

Now the training squadron is being stood up at RAF Marham, and the RAF and Royal Navy will train there.

But with the departure of the Brits, the Italians are coming next and will train for the next couple of years before their carrier comes to the US for final certifications in a couple of years.

And with the Japanese and Singaporeans likely to become F-35B users one might assume that they will learn of the charm of this lovely Southern city as well.

If you are in the F-35 program, you can decide to change the mix of variants, and I would not be surprised to see partners starting to add Bs to the mix, given its inherent basing advantage in a world where mobile basing is clearly becoming a strategic requirement.

THE NEXT PHASE OF DEVELOPMENT FOR OSPREY NATION: FROM REACH TO WORKING EFFECTIVELY IN AN INTEGRATED DISTRIBUTED FORCE

10/31/2019

Second Line of Defense

By Robbin Laird

Recently, I had a chance to visit Naval Air Station Patuxent River and to meet with Col Matthew Kelly, who is in charge of the V-22 Joint Program Office (PMA-275).

I first met "Squirt" when he was an F-35B test pilot and indeed was selected as test pilot of the year in 2011.

Having come from the F-35 world, where the entire command and control (C2) and intelligence, surveillance and reconnaissance (ISR) infrastructure is being reworked, is a perfect community for the new head of the V-22 Program to come as that aircraft is undergoing a fundamental transformation.

It is often overlooked that the US Air Force Special Forces Command (AFSOC) and Marine Corps are still the only tiltrotor forces in the world.

And the Osprey from the outset has demonstrated a speed and reach capability which traditional rotorcraft simply have not replicated.

I first saw Ospreys on the tarmac in 2007 at Marine Corps Air Station New River and have followed their evolution ever since.

As Col. Kelly noted in our conversation: "I first flew on an Osprey in Iraq in 2008.

"It was the only assault asset which could cover the entire combat theater in one flight.

"And senior officers, whether from the Army, Air Force, Navy or Marine Corps, soon demanded an Osprey to fly on when touring the battlespace.

"They could move much more rapidly and to see the battlespace in a much shorter period of time."

The physicality of the Osprey has had a major impact on the Marine Corps and its approach to its assault forces.

The reach of the aircraft in terms of speed and distance which it can cover has revolutionized how the Marines conduct assault operations.

But Col. Kelly has come to the program with a major shift underway for the Marines.

That shift requires the aircraft not simply to be a robust distance runner but to become smart in the digital battlespace.

This requires major modifications to the aircraft in terms of its ability to work with data, generate data and to work in the evolving C2 and ISR infrastructure which the Marine Corps is building for its approach to building an integrated distributed force.

Coming from the F-35 program provides Kelly with a leg up in terms of understanding what that aircraft can contribute to the Osprey and how, in turn, the V-22 aircraft needs to be modified to a more useful member of the integrated distributed force.

"With the Marine in the back of the Osprey working with his MAG-Tab (tablet), he or she is able to gain access to information flowing in from other platforms in the battlespace.

"And that is one key aspect of what we are focused on as we rework the program.

"Indeed, we have already done exercises at MAWTS-1 and VMX-1 where the Marine in the back of a V-22 can be looking on his MAG-TAB at a video generated from an H-1 or an F-35 operating in the same battlespace."

And the V-22 working with the F-35 is a key element of being able for the Marine Corps/Navy team to work a Lightening carrier approach whereby an LHD like the USS America can operate a significant number of F-35s with accompanying Ospreys.

And this approach clearly is about changing dramatically the nature of what a Marine Corps assault force looks like as well as the combat effect it can achieve.

Col. Kelly, in language reminiscent of how the ADF describes the impact of the F-35 on its combat transformation, refers to what he calls a fifth-generation assault force.

And that process this means changes need to and are being made to the Osprey itself.

With the coming of the CH-53K, the assault group will be further transformed in terms of the mass and combat force which can be delivered by the evolving capabilities of the assault force.

And the K is taking advantage of the re-crafting of the Osprey to build in from the outset the kind of digital capabilities which the Osprey did not have at birth, but are now being added within the scope of the kind of C2 and ISR infrastructure which can be built into the upgraded Osprey.

Another key aspect of the change facing the V-22 community: The Navy becoming an operator of the Osprey for the carrier resupply mission and the Japanese becoming the first FMS customer for the aircraft.

This means that the original plank holders of the program, AFSOC and the Marine Corps, are being jointed by an expanded set of users.

This places a demand on the program to do a better job with regard to global sustainment but also provides the opportunity to leverage the budgets of additional stakeholders to expand the sustainment infrastructure as well.

"There is no other air platform that has the breadth of aircraft laydown across the world than does the V-22.

"And now that breadth is expanding with the inclusion of the carrier fleet and the Japanese. We currently have a sustainment system which works but we need to make it better in terms of supporting global operations.

"With the US Navy onboard to operate the Osprey as well, we will see greater momentum to improve the supply chain."

We then discussed the impact of Additive Manufacturing (AM) on the V-22 program.

Kelly noted that the V-22 program was very forward leaning one with regard to finding ways for AM to provide supply chain complementarity on the fly, something very important for ship-based operations for sure.

"Our Marines, including MAWTS-1, have been aggressively pushing ways to use AM to support the aircraft.

"For example, last year at New River, Marines invented a tool in the tire shop to remove interior nuts and bolts off of the wheel hub.

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"They designed and produced the tool with AM and after a short turn around this tool is now being used fleet wide."

"We are doing a test today of a 3-D printed hub strap for a V-22 which is a part which has been a degrader for us in our supply system. We are working on an AM replacement for the strap and we are currently in the process of testing the part to ensure that it is a viable one."

Col. Kelly noted that with the maturation of the fleet, the program has quite accurate fleet metrics and are using these metrics to shape their Performance Based Logistics contracts going forward.

Rather than tying incentives to piecemeal elements of the aircraft, the shift in focus has been upon decreasing the non-mission capable rates in the fleet.

"If fleet non-mission capable rates go down, Bell and Boeing receive more money."

He also argued that as manufacturing experience has improved and the quality of the initially produced aircraft are better, providing a boon to fleet performance.

"The aircraft that is coming off of the line today as part of the multi-year three contract is much different than the ones produced in multi-year one or two," he said.

"You are seeing a much more reliable airplane from the outset which requires much lower maintenance man hours per flight hour as well."

In short, the V-22 team is making the aircraft smarter to go along with its range and speed physical capabilities.

And the maturing of the manufacturing processes is delivering a reliable aircraft.

But as the Navy becomes a direct user of the aircraft along with the Japanese, there are new challenges facing the program, most notably, how to provide better global sustainment to the global fleet of aircraft.

Put broadly, the aircraft which replaced the CH-46 became a physically wondrous asset that changed how the Marines could operate in the Middle East land wars to now becoming part of the fifth-generation revolution.

THE 0-5 MILITARY: RESHAPING CONCEPTS OF OPERATIONS FOR FULL SPECTRUM CRISIS MANAGEMENT

12/31/2019

By Robbin Laird

Although interesting to speculate about technology and the future of warfare, the core point is the future is now. The US and its allies have to be ready in the near to midterm to deal with 21stcentury adversaries who will use a variety of crisis management and warfighting tools to advance their interests.

This means leveraging the force we are evolving now to reshape effective concepts of operations to prevail now. For the United States, this means, in significant part, learning how to really leverage fifth generation aircraft and shape what the Aussies referred to as a fifth-generation force.

We have written for more than a decade that one piece of key technology – the F-35B – when combined with the Osprey and the new heavy lift helicopter will deliver now and in the next five years, significant distributed warfighting capabilities.

Not in 2030 or in the misty days of the third offset, or not with Dr. Griffin's space based hypersonic detection force, or with the 6thgeneration aircraft, or the Future Combat System, but right now.

It is clear that an ability to operate basing across a range of mobile basing options is a key to defeating or deflecting adversaries who are stockpiling strike missiles to go up against fixed targets.

Clearly, the Marines are well positioned right now to work through ways to enable the United States to get away from the Middle East basing construct of large fixed bases with aircraft maintained with a wide range of specialized maintenance skill sets.

It is clear as well that in the Pacific, the ability to leverage islands from which to operate an offensive-defensive enterprise is a crisis dominance capability which the Chinese would not want to contend with.

Five years ago, Ed Timperlake highlighted the strategic opportunity, which mobile ADA could provide when leveraging an island deployment strategy.

WW II was Island hopping for offensive air power-but first the enemy air threat had to be beaten back, or there would be big holes in runways and destroyed aircraft on the ground.

One could imagine the PLAAF and 2nd Arty surprise if a lot of "rocks" off shore around PRC became fortified shooters linked into Aegis Carrier Battle Groups, the USN/USMC "Gator Forces" and 7th AF air mobility and Pacific strike capability mutually cross linked and reinforced with allied capability into a solid honeycomb of Pacific defense only activated when needed.

And in a future is now approach, the premier crisis management force for the United States, the USMC. is moving out on leveraging its current technology to reshape significantly the options available to the combatant commander.

In so doing, they are highlighting why the new heavy lift helicopter, the CH-53K needs to be available to the force now and not in some distant time when the testers and Chinook advocates are satisfied.

An article by Megan Eckstein published on April 23, 2019 highlighted that the Marines are folding their F-35Bs into a new Pacific island-hopping concept.

The Marine Corps is learning how to incorporate its new F-35B Joint Strike Fighter jets into its island-hopping concept of Expeditionary Advance Base Operations, with the 31st Marine Expeditionary Unit rehearsing this concept recently in the Pacific.

The Japan-based MEU was the first to operate with the new F-35B, though its experience with the jet has been quite different than that of the 13th MEU and Essex Amphibious Ready Group, which were the first to deploy with the F-35B from the United States and the first to conduct an operational air strike with the Joint Strike Fighter.

The 31st MEU, unique in being the only forward-deployed amphibious group, has been focused on integrating the new jet into its crisis-response and self-defense missions and showing off the new plane to Pacific allies and partners, MEU Commanding Officer Col. Robert Brodie said today at the Potomac Institute for Policy Studies. If a conflict were to emerge in the Pacific, 31st MEU would likely be among the first on the scene and would likely use

its island-seizing EABO concept – so, figuring out how to conduct this mission with the new airplane was the focus of a recent exercise on a small Japanese island, Brodie said.

On Ie Shima, off Okinawa, 31st MEU conducted a standard raid and seizure: a recon team jumped in to pave the way for a raid force being flown in to seize the island.

Once the island was secured, CH-53E heavy-lift helicopters flew in fuel bladders and ordnance to conduct a forward arming and refueling point (FARP) operation with the F-35Bs.

"We were actually able to set up a refueling point, and our 53s were taking the gas from a bladder and filling up F-35s, and then the F-35s were going and flying missions," Brodie said.

"That's kind of the concept we rehearsed there. And the key to this is speed: we did not rush through it because we wanted to be very deliberate and we're in a learning phase, but I think you could do these types of things relatively quickly if you had the right ground."

Brodie said the Marines could do this type of operation with either the CH-53E or the MV-22B Osprey, but the MEU has found the helicopter works best.

"We find the 53 works out really well with the F-35, it does a great job pumping gas into it. And I think the 53K will be a tremendous asset when we incorporate it in the future," he said of the replacement heavy-lift helicopter still under development.

"We utilized our CH-53 with aviation ordnancemen; they just rolled [the munitions] right off, put it right in while the 53 was gassing up the aircraft…."

And for those who simply wish to ignore the weapons load out which the F-35 can carry when not operating in a LO mode (something which the F-15 for example can NEVER do), there is this reminder from the good Colonel.

Though the F-35B is known for its fifth-generation stealth capability, the jet can also be loaded up with weapons to serve as a fourth-generation bomb truck, and 31st MEU got to practice with that configuration for the first time outside of a test environment. Brodie said he loaded the jets up with six bombs and two heat-seeking missiles on the external pylons, and the jets dropped 30 precision-guided munitions over three weeks of training in the fourth-gen mode.

And with regard to its island operations, it could then as well provide protection for the sea base, and this could be for any of the various sea based key assets, whether carriers, destroyers or amphibious ships.

Defending the amphibious task force has been a recent push within 31st MEU, and Brodie said the F-35B could play a role in that mission that its predecessor, the AV-8B Harrier, never could. 13th MEU leadership told the Potomac Institute earlier this month at a similar event that they used the F-35B for blue-water missions the Navy assigned the ARG/MEU team.

While the 31st MEU hasn't gone quite that far yet, Brodie said the JSF would be able to spot and follow surface targets, pass information, conduct armed reconnaissance missions and more to increase the combat capability of the ARG/MEU.

Brodie brought six F-35Bs to sea, supplemented by 10 V-22 Ospreys and four CH-53Es. He said the F-35s maintained an overall readiness rate of 90.5 percent and averaged five of six jets being up and fully mission capable on any given day.

The importance of the FARP to such an approach is crucial.

Which is why in turn the need to get the K into the fleet rapidly is also crucial.

There is simply no comparison between what the legacy CH-53 can do and what the new CH-53 can do in terms of lift, C2, situational awareness, and an ability to deliver supplies over a much wider area of delivery and more rapidly.

If base mobility is important, a FARP is a key enabler.

Then why is the K not being accelerated into the fleet to support the B and its distributed force capability?

SHAPING A 21ST CENTURY KILL WEB APPROACH TO ASW: LEVERAGING THE S CUBED REVOLUTION

03/13/2019

By Ed Timperlake

A game changer in weapon effectiveness and a way ahead to deal with a most "wicked problem" facing the US Navy today is how to effectively counter Putin's threat of using HSCMs, notably aboard submarines.

My preliminary analysis on how to engage with evolving HSCM and to develop counter measures originates from a comment made by the previous CNO Admiral Greenert.

Admiral Greenert graduated from the United States Naval Academy in 1975 with a Bachelor of Science degree in ocean engineering and completed studies in nuclear power for service as a submarine officer 1

As a very smart Navy Captain noted in discussing con-ops: "we have no problem using the word attack we are Naval Officers."

Consequently, just like the famous Carrier Pilot mantra "kill the archer not the arrows" in the Navy Air Fight against strike bombers — Sinking the sub at all costs is critical.

But if that isn't achieved then the Navy then fighting HSCMs in flight is everything.

Thankfully the Navy now has now declared the F-35C carrier version operational. The best way I could hope for in looking at the problem of destroying a HSCM in flight was to identify the coming global "S-Cubed" revolution of Sensors, Stealth and Speed.

"You know that stealth may be over-rated," Admiral Greenert, the Chief of Naval Operations, noted during a speech at the Office of Naval Research Naval Future Force Science and Technology Expo, Washington D.C. (2015)

"I don't want to necessarily say that it's over but let's face it, if something moves fast through the air and disrupts molecules in the air and puts out heat – I don't care how cool the engine can be – it's going to be detectable."

The CNO was exactly right.

Admiral Jonathan Greenert, a nuclear trained Navy submarine officer, and General Mike Hostage the recently retired Commander of the USAF Air Combat Command and an F-22 pilot are in agreement on the dynamic nature of "stealth."

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From General Hostage's last interview before retirement and one which he did with us:

People focus on stealth as the determining factor or delineator of the fifth generation. It isn't; it's fusion.

Fusion is what makes that platform so fundamentally different than anything else.

And that's why if anybody tries to tell you hey, I got a 4.5 airplane, a 4.8 airplane, don't believe them.

All that they're talking about is RCS (Radar Cross Section).

Fusion is the fundamental delineator. And you're not going to put fusion into a fourth gen airplane because their avionic suites are not set up to be a fused platform.

And fusion changes how you use the platform.[2]

Just like in Admiral Greenert's initial warfighting community, the U.S. Navy's submarines "silent service," airpower commanders have the same type of relative technology dynamic against a reactive enemy but in a different medium.

Both communities have to be ready to fight in a very dangerous three-dimensional maneuvering environment where active and passive sensing and weapons and countermeasures to those weapons mean the difference between life and death.

In our discussions with Dr. Mark Lewis, former Chief Scientist of the USAF and currently head of the Institute for Defense Analysis Science and Technology Policy Institute, we focused on the threat posed by the hypersonic cruise missile.

We interviewed Dr. Lewis, a leading expert on hypersonics, in the context of rolling out an F-35 fleet with the rapidly approaching Hyper-Sonic Cruise Missile (HSCM) as a new weapon of war.[3]

HSCMs are part of what one might call an S Cubed formula for thinking about military critical technologies for 21st-century targeted R&D.

S-cubed=sensors-stealth-speed of weapons can provide a new paradigm for shaping a combat force necessary for the US Military to fight and win in 21st century engagements.

Stealth or no stealth the F-35 fits perfectly into the S3 revolution in modern war.

No matter which path is taken, the F-35 as a single platform with all three attributes combined or as a non-stealth sensor platform, employing speed of weapons carried organically or trading off with other platforms at the speed of light by giving incoming target vectors to their weapons.

Airframe design characteristics are all blended together in tradeoffs and have been focused on constantly improving, payload (improved by systems/and weapons carried), maneuverability (measured by P Sub s), speed, and range (modified by VSTOL–a basing mobility plus factor).

Stealth was a clean sheet design for F-22 and F-35 and is embedded in the total airframe and it is a very sensitive multiplicative factor; one does not add stealth.

Additionally, like all modern fighters, stealth aircraft are also designed with inherent other survivability factors, such as system redundancy and hardening.

Stealth is simply a survivability term that impacts the entire airframe and will eventually decline as better sensors are developed.

This is also why passive sensing is also a real revolution. Passive sensing can attenuate the problem of generating active "signals in space" which often can give away a platform's position either maneuvering or an absolute fixed location for a counter- attack.

Stealth dynamically over time will become more vulnerable as enemies' sensors improve.

How long and against what enemy, and where in world will the ant-stealth sensors and successful weapons be employed is unknown, but it will occur.

Modern air combat, just like submarine warfare is essentially an evolving contest of "blind man's bluff."

Even if and when stealth survivability deteriorates–ENTER the F-35 fusion cockpit with passive sensing and a significant payload of hard points.

External weapon hard-points on the F-35 are a brilliant design aspect, which is often overlooked in most discussions.

The non-stealth F-35 can sling more ordinance than F/A-18 and F-16.

So even in a non-stealth world, advantage goes to F-35, with its 360 active and passive horizontally linked cockpit decision-making ability.

As the former CNO says "payloads over performance."

An F-35 as a non-stealth fleet still has a 360-degree sensor platform with "reach not range" as a fundamental fleet enabler.

It is an information dominance fusion platform that can be favorably compared to the equivalent of being a 21st Century version of USN Destroyers standing very dangerous and heroic radar picket duty protecting the amphibious invasion force and Carrier Fleet against kamikazes off Okinawa.

As the former CNO pointed out "something moves fast through the air and disrupts molecules in the air and puts out heat – I don't care how cool the engine can be – it's going to be detectable."

Only this time against the HSCM and also a lesser-included problem of killing slower cruise missiles if F-35 did not exist it would have to be invented.

In other words, an additional benefit of R&D and con-ops efforts to kill HSCMs makes taking down conventional cruise missiles much easier.

Bluntly put, an overemphasis on sensing of hypersonic missiles from space really misses the point — it is not about being alert to what is about to kill you — it is about killing the archer and the arrow.

And we have in our hands the means to do so as we knit together key platforms which are delivering the S cubed revolution.

The future is now and working enhanced integrative capabilities moving forward with the new platforms and the relevant legacy ones is a core priority; not preparing for a new space world in 2035.

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FIGHTING HYPER SONIC CRUISE MISSILES AT THE SPEED OF LIGHT: THE ROLE OF 21ST CENTURY DAMBUSTERS

05/07/2019

By Ed Timperlake

Operation Chastise was the brilliant merging of weapon research and engineering with the undaunted courage of Royal Air Force Number 617 Squadron, forevermore known as the Dambusters.

In order to attack the industrial might of Germany the RAF and a brilliant scientist worked together to develop a unique payload utility weapon the "bouncing bomb."

The engineering genius that provided a unique payload to an RAF Squadron attacking the heart of Germany with undaunted courage was Bernard Wallis;

"Sir Barnes Neville Wallis CBE FRS RDI FRAeS (26 September 1887 – 30 October 1979), was an English scientist, engineer and inventor.

"He is best known for inventing the bouncing bomb used by the Royal Air Force in Operation Chastise (the "Dambusters" raid) to attack the dams of the Ruhr Valley during World War II.

After the outbreak of the Second World War in Europe in 1939, Wallis saw a need for strategic bombing to destroy the enemy's ability to wage war and he wrote a paper entitled "A Note on a Method of Attacking the Axis Powers".

As often with the case of visionary leaders and inventors, institutional skepticism and inertia has to be overcome. That occurred with Barnes Wallis's ideas but he refused to give up and the payload bouncing bomb "upkeep" was invented and tested over and over until it worked.

Fast forward to a 21stCentury design engineering team that is now advocating for an accelerated audition to the American way of war a Payload Utility function (PU) which is a crash program for Directed Energy laser payloads.

Wartime pressure accelerated the right payload, a bouncing bomb, in the hands of warfighters to achieve remarkable results and is now history is repeating itself with new payloads to mitigate enemy threats.

The threat of both Russia and China rapidly testing Hypersonic Cruise Missiles and soon adding them to their fighting forces is upon us, right now today, not in the year 2030.

President Putin is brilliant as an Information Warrior and to use two complementary clichés' in one sentence; he is continuing to punch above his weight while playing a weak hand very well.

He has recently threatened a direct attack against the United States with nuclear weapons if we do not comply with his strategic approach to Europe and the West.

The Russian PR machine has kicked in and we have a recent you tube visit from a St. Petersburg choir highlighting a historical tune threatening such an event.

Notably, President Putin focused on the employment of nuclear tipped hypersonic cruise missiles launched from his navy's submarines off of the East Coast of the United States.1

In effect, what Putin did was to sound "General Quarters" for a combat proven warfighting Navy to go on high alert.

The United States has now joined allies like Denmark which have been threatened by the Russians with the potential use of nuclear weapons against as part of normal coercive diplomacy.

Meanwhile, the leader of the Peoples republic of China is also strutting on the world stage in a very military provocative way with their high-speed cruise missile programs.

The United States, Russia, and China are all rushing to field hypersonic weapons.

Hypersonic weapons travel much faster than traditional weapons: While many long-range land attack missiles travel at subsonic speeds and attempt to fly below radar, hypersonic weapons would attempt to beat enemy defenses with pure speed.

This not only gives the enemy much less time to react but is also too fast for modern air defenses to shoot down–for now anyway.

Many, if not all modern air defense systems simply can't intercept a missile traveling at Mach 5+.

There is a saying on the modern battlefield, that if you emit the wrong way you die.

I would like to add to that warning, that if an incoming weapon is an "air breather" it can be acquired and targeted in a Kill Web solution with current and near-term payloads in development by the United States and its allies.

It is a shame that the Undersecretary for Research and Engineering the Honorable Mike Griffin doesn't understand the above point.

This research paper began at the 2019 Directed Energy Summit.

I asked the Undersecretary of Defense the Honorable Mike Griffin at that conference: If war breaks out tomorrow how can we stop the HSCM threat?

He immediately went to his perceived hardest problem an ICBM hypersonic maneuver multi warhead threat to frame an answer.

However, when I asked him specifically to address an air-breathing HSCM, he framed his answer in similar fashion to the ICBM threat that because of the HSCM speed it was too hard a war fighting problem.

He mentioned AARAM and Aegis against slower moving cruise missiles, but not adequate for HSCM speeds.

Note in this Breaking Defense reporting, his merging of two threat issues into one "to hard" problem:

So how do we shoot down hypersonic missiles before we develop such directed energy weapons and sensors?

We don't, Griffin said bluntly: We have to kill them on the launch pad.

"If war breaks out tomorrow, we're probably not going to kill hypersonic boost glide missiles," Griffin said.

"Existing air and missile defense systems are "very effective "are very effective against a threat moving slowly enough to give us time to acquire track, target, and deploy a shooter," he said, but hypersonics just move too fast for current defenses to intercept.

Second Line of Defense

Thankfully, visionary American military combat leaders are not waiting for the Honorable Mike Griffin's potential elegant space solution.

Those commanders facing imminent threats are intellectually working inside the evolving technology of Combat Clouds, Kill Webs, and Sensor/Shooter platforms with a goal of no platform fighting alone where platforms can all be networked to fight at the speed of light.

The promise of advances in Artificial Intelligence are also beginning to be added to this evolving American way of war.

It is actually conceptually very simple: US and Allied fighting forces both tactically and strategically at all levels are striving to network the payload utility function of selecting the best warhead that can be either kinetic and/or" tron" as the combat situation commences.

Transmitting target acquisition and then target engagement information to distributed redundant secure combat platforms over great distance can make the speed of Hyper Sonic Cruise Missiles (HSCM)a solvable problem.

If appropriate DOD R&E focus is supported conceptually to pull together existing technology and weapons systems then a threat mitigation way ahead is ready now and not waiting for a possible space solution in 2030.

Just like the need for accelerated development of weapon technology in WWII, the time is now to recognize that American scientists and engineers who refused to give up when faced with a potential career ending moment in the development of laser weapons simply refused to stop their research.

Secretary of Defense Robert Gates killed all research on an Airborne Laser weapon and he based it on his cost calculations. Remember this is the same guy that spent $52 billion on 22,000 MRAPs left rusting in the Middle East or in storage with engines removed. Ultimately broken up on 25 September 2014.

Secretary of Defense Gates summarized fundamental concerns with the practicality of the program concept:

"I don't know anybody at the Department of Defense, Mr. Tiahrt, who thinks that this program should, or would, ever be operationally deployed…. And if you were to operationalize this you would be looking at 10 to 20 747s, at a billion and a half dollars apiece, and $100 million a year to operate. And there's nobody in uniform that I know who believes that this is a workable concept."

The Air Force did not request further funds for the Airborne Laser for 2010; Air Force Chief of Staff Schwartz has said that the system "does not reflect something that is operationally viable."

Gates had ensured no opposition by firing Secretary Wynne and COS of the USAF General "Buzz" Mosley. This is the same Secretary of Defense who killed the "cold war" airplane, known as the F-22.

But some USAF Officers and their scientific and engineering partners did not stop; In fact, the did just the opposite — they created Directed Energy Summit

Recently, the fifth annual 2019 Directed Energy Summit was held.

It was co-sponsored by Booz Allen and the Center for Strategic and Budgetary Assessments (CSBA).

Discussion at the DES focused on "the urgent need to acquire directed energy weapons to help counter significant existing and emerging threats."

It must be recognized that "Fighting at the Speed of Light" means networking information flowing at the speed of light throughout Kill Webs that operate a payload utility function.

The ability to acquire and designate threats while engaging the best payload for a successful outcome is the payload utility function.

Payloads can be kinetic and "tron" depending on the need.

It is fortuitous that lasers go hot at the speed of light but they are still just subsumed in a "light speed' engagement.

For example, if it means the survival of a Carrier Strike Group, I doubt any fighting Admiral would not hesitate to employ a low yield Nuc kinetic warhead to stop incoming hypersonic threats.

Laser research and the need for rapid fielding of a new "tron" weapon in our inventory just came out of the 5thDE Summit.

Like the legend of The Phoenix, our warriors, scientists and engineers never gave up and their time is now.

At the DES, Henry "Trey" Obering III, an Executive Vice President and Directed Energy Lead at Booz Allen Hamilton and the former director of the Missile Defense Agency, argued for a 10-point plan to accelerate the effort for directed energy weapons.

1. The Defense Department must scale up laser power and improve beam quality development. The pace of maturing these capabilities is not technology-limited – it is funding-limited. Therefore, we should increase directed energy funding to between $2 billion to $3 billion per year.
2. We should also take further action to reduce the size, power, weight, and cost requirements of these weapons. The Office of the Secretary of Defense, for example, should establish and fund a separate program toward that end – and to focus broadly on improving laser weapon lethality. MDA laser programs should be fully funded to increase laser power levels for high-altitude and space-based applications.
3. We must provide warfighters with tactical decision aids to ensure they know how and when to use these weapons. This will go far toward instilling confidence in our warfighters that these weapons will be effective in combat against multiple threats.
4. While a tremendous amount of work has been done, we should also conduct further research to improve our understanding of laser lethality and reliability across an increasing range of weather and atmospheric conditions. This research should also focus on minimizing any collateral damage.
5. We need to accelerate our acquisition of these capabilities. DoD takes more than 16 years, on the average, to bring new technologies from statement of need to deployment. But there are several examples of this timeline being dramatically shortened, such as the Navy's Rapid Prototyping Experimentation and Demonstration program for mission-critical capabilities and the use of specialized acquisition authorities by the MDA. DoD should use such accelerated processes for directed energy development and deployment.
6. DoD must signal a long-term commitment to lasers, so the industrial base will know there will be a market for its products in the coming years. In doing so, DoD should prepare, and encourage, the industrial base to support the rising need for first-, second-, and third-tier suppliers.
7. DoD should fully fund existing tests at sea, on land, and in the air – and there are many. Navy projects, such as the Laser Weapons System aboard the USS Ponce, have already shown that lasers can shoot down drones and collect surveillance data at long range. Other higher-powered Navy lasers, such as the HELIOS system, are in development and will be on a surface combatant next year.

Second Line of Defense

Meanwhile, the Army has tested a 5-kilowatt laser mounted on a Stryker combat vehicle and aims to field-test a 50-kW Stryker-mounted laser in 2021, with a goal of fielding it by 2023. Plus, the Air Force's SHiELD project is developing 50-kW air-based lasers to produce a fighter-compatible weapon for use by 2021.

8. All parties involved in laser deployment should talk to each other. DoD needs to better articulate its requirements for deployable lasers. But also, the industrial base must interface better with DoD and its leadership to increase understanding of innovative laser weapon capabilities.
9. We must also prioritize warfighter training. There is currently no established laser weapon training pipeline, and that's because lasers have no formal programs of record. Once these are set up, training must follow. To assist in establishing such programs, we should encourage wargames and operational analysis to investigate and better articulate the battlefield benefits of lasers.
10. DoD should adapt command-and-control functions to address rapidly evolving threats, such as hypersonics, to reduce the engagement times of defensive systems. Very short engagement timelines will likely necessitate the incorporation of artificial intelligence capabilities to help the U.S. leverage the speed-of-light engagement that directed energy weapons offer.

These are the steps we can take to bring laser prototype systems to our warfighters.

Our brave men and women confront dangerous threats across all physical domains – land, air, sea, and space – and need nothing less than the world's most promising new capabilities to protect our national security.

Our adversaries are not waiting to develop directed energy weapons.

Neither should we.

The US defense industry is ready now and into the future as a key R&E focus on fighting at the speed of light and it all began to come together over ten years ago with the creation of the F-35 global enterprise as the driver for 21st Century change, including industrial base changes.

And it should be noted that this generation's Dambusters are key stakeholders and innovators in the F-35 global enterprise, and will operate off the world's newest aircraft carrier.

These modern day Dambusters are joined at the hip with the US Navy and USMC, as they have initially trained at MCAS Beaufort, and both the Marines and the Navy are working closely with the stand-up of the new UK carrier capability as well.

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

The American 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.

THE SURFACE FLEET, ASW AND DEFEATING HYPER-SONIC CRUISE MISSILES: THE CASE OF THE ZUMWALT CLASS

03/08/2019

By Ed Timperlake

The US Navy and the surface fleet is very much engaged in our strategic and tactical thinking about how to defend against the emerging Hyper-Sonic Cruise Missile threat.

Of course, the best way to stop a HSCM is to sink the enemy sub before it has a chance to fire.

A new player which could play a key role in a kill web approach could be the new Zumwalt class destroyer. There are three ships in this class, but rethinking the key role it could play in a kill web approach to the HSCM and other threats might lead to a rethink.

I have had a lifelong experience with the US Navy first as a "Navy Junior" because my father was career subs and an early participant in the Nuc Sub Navy serving on the USS Triton (SRN-586).

After graduating from Annapolis, I entered the Marines and became a Carrier qualified Naval Aviator so have had a lifetime of experience with the learning cycle for the sea services.

My key takeaway is that the Navy has proven to be absolutely ruthless in dealing with technology.

The Navy leadership in my personal experience has always been unrelenting on making the very hard choices on giving the best platforms and weapons to their sailors, after having the most open mind of any military in the world on pushing R&D efforts.

Of course, ugly politics often intrude beyond their control in the form of Congressional and OSD meddling. As always in our Constitutional process, one has to respect that civilian control.

But left to their own devices the Navy most often gets it right.

In an article which I published in The Washington Times a decade ago, I addressed how the Zumwalt can address the ASW challenge effectively.

On March 8, five Chinese ships converged on the USNS Impeccable, which was operating in international waters in the South China Sea. The dramatic confrontation was diffused but could have easily turned ugly.

At the time of the incident, the Impeccable was gathering intelligence about 70 miles south of Hainan Island, home to China's newest and most sophisticated submarine base. China is in the process of creating its most lethal and stealthy fleet of submarines. Through an accelerated construction program and by purchasing ultra-quiet Russian subs, the Chinese are working toward a massive naval expansion, which is expected to top 200 attack and ballistic missile subs.

When China went after the Impeccable last month, the Chinese navy (or more accurately their Coast Guard), sent a powerful and very public signal from the waters off Hainan Island that they are worried about the U.S. Navy's antisubmarine capabilities.

Chinese subs leaving port to hide in deep water must be identified and followed as they sortie out from the shallow waters. Now a significant capability of the Zumwalt-class destroyer becomes essential – the ability to defend itself with a significant punch while locating, tracking and identifying Chinese submarines in the cluttered littoral waters off Hainan Island and elsewhere.

Official Navy testimony delivered July 31 pointed out that the Zumwalt-class destroyer is "superior in littoral ASW" to the Burke-class, which has better "blue water" ASW. It the equivalent of a football coach saying the linebacker is superior at the line of scrimmage but the safety is better for deep coverage; both ship classes on the same team are hugely complementary.

Both the Burkes and Zumwalts will have the range and endurance well beyond the capability of the smaller Littoral Combat Ship (LCS). If both are combined in an ASW task force or going together in harm's way as part of a carrier battle group, they will be mutually supporting and deadly.

Second Line of Defense

Should a Chinese ballistic submarine make a run for open water in times of a building crisis, a future Zumwalt destroyer can tag it in shallow water, follow it to blue water and pass that intelligence along to a Burke destroyer and American attack submarines. This not only keeps America safer; it also keeps American sailors safer.

People can have honest disagreements over which of these two ships to support. But as China expands its submarine capabilities, there's no doubt which American destroyer Chinese sub commanders would rather see scrapped. With superior littoral ASW capabilities designed to detect the quietest electric-powered stealth subs, the Zumwalt-class destroyer is a far greater threat to China's growing submarine fleet.

If one goes back to my article of 10 years ago and if you simply substitute the Russian sub threat for the Peoples Liberation Army Navy sub threat highlighted in my analysis, the potential role of the Zumwalt is quite clear.

Now with the Russian "gremlin" again on our doorstep, the shallow water ASW capabilities of the Zumwalts might be of considerable value providing a key element in the Atlantic Sea Frontier.

THE IMPACT OF A "READY ON ARRIVAL" US NAVY ON CRISIS MANAGEMENT

03/05/2019

By Ed Timperlake

The famous Navy saying "we are ready now" also means Navy R&D focus is to always be ever vigilant in building for the future. The future is now but it is anchoring as well a way ahead.

In fact, for 2025 and beyond, the US Navy is the gold standard for the world for R&D research in understanding the technological imperative of an action/reaction cycle of weapons development against a reactive enemy.

We have moved from an organic Carrier Battle Group to a kill web "no platform fights alone" approach which expands the impact of the carrier on the battlespace and in turn the carrier can leverage joint capabilities not present on the carrier itself.

There is also the great historical demonstrated strength in the combat history of the Navy with their famous "Ready on Arrival" combat ethos.

With the current endless wars, a lot of attention has been focused on the combat effectiveness of the large deck carrier.

When a Carrier Strike Group, previously called a Carrier Battle Group sorties into harm's way it is a global power projection combat capability.

In 1966 the US Navy made a short movie about what was then called an "Attack Carrier."

The movie describes going to flight quarters and conducting combat air operations from an aircraft carrier off Vietnam.

The US Navy when sent in harm's way does whatever is asked to their last full measure, combat is their profession and loyalty to the Constitution not politics is their code.

"Ready on Arrival" highlights a simple truth evident today off Afghanistan that the direct lineage of the large deck aircraft carrier is an American point of pride.

A modern carrier ready today launching into Afghanistan personifies the fundamental point of the movie that the U.S. can with unexpected events put a Carrier on Station to support friends and confront enemies.

Note that at times, as stated, the surface Navy can also undertake independent offensive operations, as the Russians in combat support for the President of Syria recently found out, after the Syrian President used chemical weapons on his opponents:

"They that go down to the sea in ships that do business in great waters."

Psalms 107:23-31

When President Trump gave the go order to attack Shayrat Air Base Syria, where a chemical attack had been launched, two US Navy surface warships stood ready to implement the order.

In one shining moment with Tomahawks fired from USS Porter and USS Ross, the world knew a new Commander-in Chief was at the helm.

It was reported that 59 of the 60 Tomahawks hit the intended target. Our way of war was to actually warn the Russians to minimize any chance of Russian's being hit or killed — how nice for them.

The USS Porter and USS Ross successful attack showcased the command structure of the 21st Century Navy.

No finer complement can be given to the 21st Century navy and the dynamic and extremely successful contribution's being made by the admission of women to the US Naval Academy than seeing the Commanding Officer of USS Porter have her crew earn an historic famous Flag Hoist "Bravo Zulu" for Job Well Done.

Cmdr. Andria Slough graduated from the academy with a Bachelor of Science degree in ocean engineering. She serves as the commanding officer of the USS Porter, a Navy destroyer in the eastern Mediterranean Sea.

Performance counts from day one regardless of how one earns a commission.

The Skipper of the USS Ross, Commander Russell Caldwell, hails from Johannesburg, South Africa. Commander Russell Caldwell graduated the University of Kansas with a Bachelor of Science in Political Science and was commissioned on January 10, 1998.

The other "ready now" teams engaged in direct combat have been the special warfare community, the Navy SEALs, who also work with the Navy's Silent Service.

I had the opportunity in December 2011 to see an advanced preview of the movie "Act of Valor," an action thriller about US Navy SEALs, and my first impression was that it was sending a very powerful message to the enemies of America: Navy SEALs will be coming and you will be killed.

It was refreshing and rather unique to see a movie identify the real enemy; fanatical, death-loving Islamist extremists and no politically correct BS with surrogate enemies such as machines, fighting robots or space aliens.

Also appreciated was how the film depicted the military without emoting or second-guessing their chosen profession.

The almost obligatory Hollywood "Oh the inhumanity of it all!" moment did not arrive.

Some SEAL teams may have pensive introspective poets or tortured souls in their ranks but not in this movie.

Second Line of Defense

The real payoff of taking the risk of using actual SEALs was the fluidity of their motion.

They moved like real warriors.

Based on my many years of experience, the real military is just as it is depicted in the film.

The physical movement, use of technology, submarine featured, and firepower and an ending that provides a sobering reminder of the human cost of fighting terrorism make this film outshine your standard action/adventure movie.

What President Putin and his IW propaganda team do not understand is that as a Carrier Strike Force goes forward the Admiral and his entire team are ever vigilant about unknown submarines.

Just because the Navy doesn't talk much about all aspects of Anti-Submarine Warfare doesn't mean they ignore that domain, in fact it is just the opposite.

SQUADRON FIGHTER PILOTS: THE UNSTOPPABLE FORCE OF INNOVATION FOR 5TH GENERATION ENABLED CONCEPTS OF OPERATIONS

03/07/2016

2016-02-28 By Edward Timperlake

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.

One point that has to be noted is that in the cycle of fighter designs some aircraft have were designed with a crew concept. Examples are the F-4 Phantom II at one time active in the Air Forces of 12 nations, the USN F-14, and some type/model/series (T/M/S) of the F/A-18 and the F-15E.

The two flying warriors regardless of T/M/S and designation RIO-Radar Intercept Officer for Sea Services or WSO-Weapon System Operator for USAF were 100% peer partners and the fighter could not have engaged to fight and win without solid crew mutual support in the cockpit. The use of the term Fighter Pilot in no ways ignores this partnership.

It is just that so far 5th Gen TacAir, F-22 and F-35 are single seat aircraft.

To understand the intangible of pilot performance and the future combat success of the F-35, Lightning II, one just has to listen to what the military pilots who actually are fly the aircraft are saying, all other critics are second order.

The new batch of F-35 aviators is still being led by Flag Officer aviators (0-7 and above) who have gone before. Those leaders began their fighter pilot journey in earlier generation tactical combat aircraft.

But the intangibles of squadron flying and learning transcend generations.

Until October 2015 Marine Corps pilots flying the F-35B have been second tour pilots. That is, they are pilots with flying backgrounds and with combat experience.

The VMFAT-501 Warlords, the squadron focused on initial combat training at MCAS Beaufort had their first tour "nugget" pilot coming to fly the F-35B. That first tour Naval Aviator serving as a Marine pilot is just the first of thousands that for decades to come will join the F-35 global fighter pilot world.

This is what Lt. General "Dog" Davis (an AV-8 pilot), the Deputy Commandant of Aviation, once the I Pad generation pilots coming into the force:

"I think it's going to be the new generation, the newbies that are in the training command right now that are getting ready to go fly the F-35, who are going to unleash the capabilities of this jet.

They will say, 'Hey, this is system will give me. Don't cap me; don't box me in."

It can never be underestimated how important it is that the now senior aviation commanders, regardless of service or country, had to rise successfully through squadron life to arrive at the top of Wolfe's pyramid of excellence in their specific combat aircraft whether they flew F-4s, AV-8s, F-14s, F-15s, F-16s or F/A-18s.

It is a brutal fact of winning or losing an air campaign that past combat experience in the air count can count strongly regardless of fighter flown at the time.

The current new cohort of F-35 Squadron pilots, at all ranks, are building on a powerful legacy of air combat forces that have been forged in a life and death cauldron of two magnificent victories.

A perfect example of the generational transition of a tested pilot raising in rank to senior general officer command who is now leading his fighter pilots into the future is the Commanding General of the USAF Warfare Center, Nellis AFB 5, Major General Silveria, who graduated from USAFA '85 during the Cold War, who now is a qualified F-35 pilot.

From his USAF official bio: General Silveria has flown combat sorties over the Balkans and Iraq and served as Vice Commander at Bagram Air Base in Afghanistan. He is a command pilot with more than 3,800 hours in the T-37, T-38, F-15C/E, HH-60 and F-35A aircraft.

General Silveria's command saw on January 15th, 2016, the fifth F-35A landing at Nellis, and was the first F-35A fully configured for the planned initial operational capability for the USAF next year.

This specific aircraft addition to the weapons school marked a crucial moment in shaping the way ahead, as General Silveria comments:

"Having this aircraft at Nellis represents the beginning in the operational tests in earnest for the F-35 program and represents the beginning of tactical development of the F-35 at the weapons school.

Second Line of Defense

We have some F-35s here in earlier configurations, but the plane, which landed today, is the plane we will go operational with.

We need this aircraft and this configuration to shape the tactics in taking the aircraft into operation in 2016.

This is the first of many as more F35s will flow into Nellis this year and next.

The pilot who has landed today is the first pilot in the 57th Wing in Nellis, which will be writing the syllabus for the Weapons School with the first pilots graduating from that program in 2018."

The Past as Prologue

These now senior combat pilot commanders, albeit much junior at the time, achieved two magnificent victories; winning the air rivalry against the USSR in the Cold War and achieving an historic allied success in the magnificent air campaign of Desert Storm.

The lesson for the air power rivalry between the US and USSR is rather straightforward: the technology had to be available but it also had to be successful understood and employed.

A historical take away from the cold/hot war air battles is that in the air-to-air mission a country that equips its fighters with airborne radar and sensors allows more autonomous action and actually favors tactical simplicity and operational autonomy—even though the equipment becomes more complex.

In air-to-ground, airborne simplicity indicators are usually smaller formations and allowance to maneuver independently into weapon launch envelopes primarily in a weapons-free environment. Embedding technology into the weapon itself –bombs and rocket-fired weapons– has also made a revolutionary difference.

In air combat a nation must always assume a reactive enemy can develop the necessary technology to try and mitigate any advantages. With the worldwide proliferation of weapons even a second or third world nation might have state-of-the art systems.

The air war over the skies of Vietnam and in the Middle East in the Yom Kippur War was between two aviation technology peer competitors because of USSR TacAir type/model/series (T/M/S) support to aerial advisories.

The lesson on the Cold War US-USSR rivalry is that air combat leaders must be able to adjust during the course of an air battle or war by changing strategy and tactics, to achieve exploitation of the enemy's mistakes or weakness.

Aircrews must be adaptable enough to follow changing commands from leadership and also, on their own initiative, to change tactics to achieve local surprise and exploitation. Like the quote in Animal House: "knowledge is good." In the cockpit, it can be a lifesaver and aid in mission accomplished.

An air-to-air engagement totally slaved to a ground-controlled radar attack, the USSR model was a colossal failure and deadly to a lot of pilots locked into such a system.

A bottom-up approach with evolving aircraft system capabilities in a competitive airframe makes for adaptive, creative aircrews that will have a large repertoire of tactical moves and a better chance of getting inside an opponent's Observe, Orient, Decide and Act (OODA) loop.

This is true for both air-to-air and air-to-ground combat missions.

As the history of war in the air shows it was a constantly evolving process of human factors integrated into technology. The Cold War ended well for humanity and a lot of courageous pilots, bold leaders, and smart technologists deserve a lot of credit for this great victory.

The US would be wise to remember the lessons learned and along the way the loss of very good men in the air who paid in their blood for America and our allies today to have the best technology available flown by best combat aviators a country can produce.

And the challenge will be to shape evolving concepts of operations to take advantage of the 5th generation aircraft and the associated new tools of combat.

With respect to the Desert Storm Air Campaign, a US Air Force fighter pilot at the rank of Squadron Commanding Officer (0-5 LTC) succeeded in refocusing the combat potential of airpower that carries forward to this day:

In a Breaking Defense piece published on January 20, 2016, Lt. General Deptula (F-15 Fighter Pilot) looked back at Desert Storm and it applied its lessons to the current air operation in the Middle East:

When the clock hit 0300 on January 17, 2016 in Baghdad, it marked the 25th anniversary of the start of Operation Desert Storm, a turning point in the conduct of modern warfare.

Desert Storm changed major conflict in five principal ways:

It set expectations for low casualties–on both sides of the conflict;

It presaged precision in the application of force;

It introduced the conduct of a joint air campaign that integrated all service air operations under the functional command of an airman;

It established desired effects as the proper focus of strategy and of the ensuing planning and conduct of operations;

And it relied on airpower for the first time ever as the principal force in the strategy and execution of a war.

Ground forces acting as a blocking force while airpower destroyed enemy forces from above during the 43 days of Desert Storm airpower. Only in the last four days of the conflict were ground forces committed to combat with the goal of evicting Iraq's occupying forces from Kuwait.

Desert Storm's opening-night attacks signaled a radical departure in the conduct of war. This was not a linear rollback campaign: It was a strategic campaign using focused attacks against key nodes in a concurrent, simultaneous fashion. More than 150 discrete targets—in addition to regular Iraqi army forces and surface-to-air missile sites—made up the master attack plan for the first 24 hours. The war began with more targets attacked in one day than the total number of targets hit by all of the Eighth Air Force in the years 1942 and 1943 combined.

That was more separate targets attacked in less time than ever before in history.

The first two challenges required technological solutions that simply had not matured until the late 1980s.

Those two solutions were stealth and precision.

Second Line of Defense

To provide insight into the importance of those two developments, during the first 24 hours of Desert Storm, stealth, precision and effects-based planning allowed the use of just 36 stealthy aircraft armed with precision-guided munitions against more separate targets than the entire non-stealthy/non-precision air and missile force launched from the entire complement of six aircraft carriers and all other ships in the theater combined.

That stealthy F-117 force flew fewer than 2 percent of the campaign's combat sorties, yet struck more than 40 percent of all Iraqi fixed targets.

The combat leverage that stealth made possible in the Gulf War can be further seen in the case of the first non-stealthy attack on one target with three aim points on Shaiba airfield in the Basrah area of southeast Iraq.

It took four Navy A-6s dropping bombs, four Saudi Tornado bomb droppers: five Marine Corps A-6Bs for jamming acquisition radars, four Air Force F-4Gs taking out one type of surface-to-air missile system, 17 Navy F/A-18s taking out another SAM system, four additional F/A-18s as escort, and three drones to force the enemy radars to radiate. That made for a total of 41 aircraft, with just eight of them dropping bombs on three aimpoints connected with just one target.

At roughly the same time, the US had 20 F-117s airborne, with all 20 dropping bombs on 38 aim points associated with 28 separate targets. So less than half the number of aircraft hit more than twelve times the number of aim points.

Enter Today's Squadron Pilot

Among the most intangible qualities of a combat force are those cultural factors that influence its basic fighting capabilities. These qualities can be of paramount importance.

To take what is the most sensational example, consider the Kamikaze pilot. No mere quantitate assessment of the Japanese tactical aviation forces of the Second World War could have accounted for Kamikazes. Only an assessment of cultural characteristics could have keyed analysts to the possibility. In retrospect, we can understand that the Japanese belief in the divinity of their empire and the cultural abhorrence of shame could allow for creating pilots sufficiently motivated to embrace suicidal missions.

The example of Kamikazes is not representative of this discussion, but only illustrates those cultural factors, despite their intangibility, must somehow be reckoned with.

One of the essential elements of creating a successful combat fighter pilot is simply motivation often expressed as dedication, heart, will, ambition or competitiveness. It captures the qualities of a fighting force that makes its warriors enthusiastic rather than lackadaisical or dispirited.

Of course, inside the ever-advancing complexities of 21st Century 5th Gen aircraft technology and the resulting con-ops there is a factor of also recognizing a fighter pilots a technological capability match which is the capacity of a pilot to understand and operate the rather sophisticated technology of their state-of-the-art aircraft.

So the challenge for any serious nation that invests in an Air Force is to select, train and employ the best fighter pilot they possibly can. If Fighter Pilots could be engineered like engineering ever advancing physical technology it would have already been done. But that is not the case so an approximation of pilot effectiveness can be made on basis of training until real combat becomes the final and ultimate judge.

Techniques for transforming fledging students into proficient combat pilots have evolved through the years as the result of much research and development. Although training techniques constitute a necessary, although not completely sufficient, component, they are actually becoming increasingly important as weapons and warfare become more complex.

There are, of course contributors to pilot proficiency other than training techniques.

The inborn abilities some pilots seem to possess play a huge part. But there is little reason to believe individuals with these natural abilities exists disproportionately among nations.

In fact, the actual combat history of kill ratios show that many nations can produce both Aces (5 kills) and even super-aces with many, many aerial victories. What clearly does play a role and can differ significantly from one nation to another are the cultural and social qualities that give air-crews the motivation to fight and the basic capacity to successfully use the technology in the aircraft and weapons they fight with.

"Flying should be an inherently dangerous business to weed out the weak sticks," is a Marine pilot's saying. One would hope that there could be less dramatic and much more cost-effective method for developing aviators.

But a brutal fact of combat is to that be a good combat pilot one must fly the aircraft well right up to the edge of its flight envelope.

It is in the early training toward their "Wings" all the worlds air forces must train their pilots to simply fly successfully so at least they will not crash their aircraft frequently.

Beyond safely flying around the base flag pole, the real focus of creating a successful Squadron Fighter Pilot rests in the dynamics of combat training and then subsequent proficiency training as the individual rotates in and out of a squadron.

The list is not complete but combat training for the first tour "nugget" has drivers such as a Training and Readiness syllabus (T&R Manual). Different Air Forces have different names but it is a check list of "hops" increasing in complexity that a newly arrived aviator must successfully accomplish to advice in sequence in order to become fully combat qualified.

A key intangible, that should never be overlooked, is the source of instructors during this combat training cycle, along with measurable indices such as live firing/weapons release, and simulator training Combat training is a progression of building block sorties of more and more demanding tactical and weapon training flights that will ultimately rise to the level to operate their fighter against the highest threat environment in the world.

Once an aviator in any nation has achieved the distinction that the leadership thinks they are ready to go to war, they either enter a combat theater, or must continue in demanding proficiency training. Also after their first tour because they may have been cycled out of flying for another assignment, a fighter pilot eventually returning to the cockpit must begin proficiency training all over again.

Elements of proficiency training can include actual combat: which is everything.

It is important to recognize that US and some Allied airpower forces, have had some previous combat flying after Desert Storm, such as over the Balkan sky and in Iraq called Northern Watch and Desert Fox. US airpower has been engaged in constant combat since soon after 9/11.

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Like the legacy of WWII to the Cold War and Deseret Storm this demanding combat flying, thankfully with far fewer causalities, is a huge factor experienced by this generation as they advance in rank to lead the next generation of Squadron Pilots.

Time in the air, and specifically time in type doing tactical flying is of utmost importance.

Without actual combat intensive training can include advanced exercises such as Red Flag and also very specific focused training such as going through the Top Gun program. Such programs greatly influence not only proficient tactical flying to edge of the envelope, but also create a critical dynamic fed-back loop of ever improving combat tactics to fight and win.

This is very evident a Fallon because, a perfect example of real time dynamic development of combat con-ops was described by Rear Admiral Scott Conn, (F/A-18 Fighter Pilot) Commander Naval Strike and Air Warfare Center:

"Question: We found it interesting that your strike integration training involves as well regular dialogue with the deployed carriers and apparently you work in support of the deployed fleet as well in shaping TTPs, which they might need in ongoing operations. Could you speak to that process?

Admiral Conn: NSAWC innovates in peacetime while providing the reach back support to adapt in war. We are in regular communication with the deployed carriers, and provide technical and tactical reach back support to address observed shortfalls in combat to existing TTPs.

An historical example of how NSAWC provided reach back support to the forward deployed warfighter was in the early stages of Afghanistan operations. Ground commanders needed aircraft to strafe at night. To do this strafing mission at night, aircrew needed to put an airplane below mountaintops, perhaps in a valley, provide bullets precisely and then pull off target, and not fly into the terrain.

When NSAWC got this request, in a matter of weeks because it wasn't overnight, a couple weeks, we came up with the tactics, techniques, and procedures for the fleet to execute that mission. We then folded those TTPs into our training for follow on deployers.

And the connectivity we have with the fleet through modern communications allows for an ongoing combat learning process between Fallon and the fleet and this flow of information is central to the process of training in the 21st century."

The Squadron Pilots Get Their Hands on the F-35

Before the first F-35 Lightning II took off, American and allied defense industries were put to the test: build the very best. They have met that challenge.

"Scientists dream about doing great things. Engineers do them" from the James Michener book Space. The quote originated from one of the legendary American Aeronautical Engineers, Jack Runckel who began with NACA before WWII and finished with NASA. As many history books state: During World War II, NACA was described as "The Force Behind Our Air Supremacy."

Just like the aviators who will fly the F-35 who are well trained and the top of the famous Tom Wolfe's "pyramid" in his book The Right Stuff, there is a team of engineers – American and Allied — in the defense industry and at the U.S. world famous test centers such as Pax and Edwards, who are equally dedicated and at the top of their profession in giving the warriors the best possible weapon system.

Senior Airman Michael Sterchi, a C-130 Loadmaster from the 700th Airlift Squadron, listens to Mr. Mike Skaff, chief engineer of pilot/vehicle interface for the F-35 program, for some pointers on flying an F-35C off the carrier, 31 Aug. 2011. Skaff played a key role in modernizing the F-16 cockpit and saved lives and his experience has provided the baseline for shaping the way ahead for the F-35 cockpit as well.

Many who have never made the effort to engage, understand and recognize the US envy of the world defense industry's remarkable success often target the very honorable and dedicated workforce with extremely negative comments.

American, USAF, USN and USMC and Allied F-35 test pilots' day in a day unheralded at personal risk to themselves and always the possibly of bring tragedy to their loved ones, have mostly been ignored while still leaving critics in their jet wash.

For example, it was very telling that only three media outlets were present at Navy Pax when the Italian Test Pilot "Ninja" a former Tornado pilot with only 50 hours in type made his record setting flight across the North Atlantic in winter flying an F-35 manufactured in a brand new facility in Italy with only 15 hours on the airframe.

Every generation of test pilots flying the latest T/M/S fighter addition to their service at both Patuxent River Naval Air Station and the USAF Test Center at Edwards AFB have the most fundamental question always asked by their leaders— How to hold them back?

As the very first F-35s rolled off the factory floor and entered the military testing world, it is critical to note that the pilots testing the F-35 to the edge of the envelope were Squadron Pilots first.

From Chuck Yeager's great success as a fighter pilot in WWII (a double ace, 11.5 kills including a German jet) to his breaking the sound barrier, to the Mercury 7 Astronauts, three Navy Pilots, three AF and the US Marine John Glenn who were first American's in space, to today's test pilots it must be noted that they all began in an operational Squadron.

Test pilots being squadron pilot warriors first is not unique to the American flying services as the collection of other nations test pilots fully integrated into the F-35 flight and operational test regime proves.

One of the most impressive and again little noticed fact of the F-35 progression toward Initial Operational Capability (IOC) with US and Allied flying forces is that they are a team of peers around the globe. Never before has such a wide raging state-of-the-art test/IOC effort been attempted and now has been proven successful.

The F-35 is essentially a combat aviation club that is only limited by the imagination and skill of those who will fight the aircraft in the air.

As the F-35 moves into squadrons in different nations with different potential combat challenges around the globe all fighter pilots share a unity of purpose. Using the trite cliché "global commons" does not come close to what is occurring.

It is much more co-equal partners in 5th gen combat sharing in which the quest of being part of a team of victorious killers is much more the "combat commons" that all aspire to join.

Pax river test pilots in a 2010 interview of USMC Test Pilots "Squirt" and "Tinman" to a 2016 interview with US Navy Test Pilots "Dutch" and "Tonto" capture the evolving maturity of the test cycle for fleet wide US Sea Service IOC Squadrons.

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"Squirt", test pilot of the year shortly after our interview and a former F/A-18 Squadron pilot was deeply involved in the pilot/helmet/fusion cockpit interface, which is a critical component of the XXIst Century Man-Machine Revolution. With the very real computer revolution moving with light speed into the 21st Century there is now a powerful design dynamic at work —the man-machine interface.

With the very real capability of three-dimensional sensing and being able to distribute information to other fighters, airborne and on the ground or at sea the relationship of the individual pilot to knowledge of the bigger air battle is truly revolutionary.

"Tinman" a former USMC AV-8 pilot who flew in the at sea trials marveled how easy the F-35 was to fly and put the nose tire in a one square box on the pitching deck of the USS Wasp.

Consequently, one of the most underappreciated aspects about the test program is how the concurrent learning among the various test centers provides enhanced confidence and accelerates testing with all T/M/S of this new aircraft.

The cross learning from the USMC F-35B, the service's first T/M/S to achieve IOC, to the USAF F-35A to the USN F-35C model — with the preparation of the first RAF F-35B squadron — has meant that the USN can operate its Cs more rapidly and with more confidence and capability than in a traditional single-model aircraft test program.

This fact was brought out five years later in early 2016, at Pax when "Dutch" a very accomplished Navy fighter pilot with over 600 cats and traps in the F/A-18 stressed how stable the F-35 will fly around the boat.

During the Vietnam War, there were tests done of carrier pilots' heart rates which we actually higher when landing on a carrier than when being shot at over Hanoi:

"The flying qualities are excellent and the machine systems built into the plane significantly enhance the ease of landing and taking off from the carrier.

Basically, with the F-35 you get your mission cross-check time back.

Normally once you start the approach your scan is solely meatball, line up, and angle of attack. Your mission cross-check time behind the ship is zero because you're just doing that scan.

With the F-35 and its enhanced flight controls and superb handling, the aircraft doesn't deviate much from the desired flight path, which greatly eases the workload on the ball and frees up your scan. —It almost makes flying the ball a relaxing task!"

The fact that the Navy Test Pilots will rotate back into combat was not lost when Tonto made a seminal combat point about the generational shift from F/A-18 Hornets to the USN F-35C:

"How do you see the F-35 affecting tactical training?

Answer: With the current air wing (i.e., with the Super Hornet and Hornet as the tip of the spear), we are wringing out our tactics for a tactical advantage, which is also, at the same time, at the edge of the envelope for survival.

"We are spending a lot of time making sure that we have the right tactics and the mastery of those tactics by pilots to survive and succeed. It is about keeping a level of competence and capability where you're not going to die.

"There are points where you have a twenty second window. You miss that window and you might be blown up!

"When you're traveling at those speeds, we are talking really only a couple of seconds that you have. And, if you're not performing tactics exactly as they're prescribed, you put yourself in a kill zone.

"With the F-35, we are jumping a generation in tactics and now looking at the expanded battlespace where we can expand our impact and effect. You need to take a generational leap so we are the ones not playing catch up with our adversaries."

While test pilots are wringing out the F-35 and ignoring critics, senior officers are constantly challenged to fly top cover against know-nothing second and third order derivative critics whose only contributions are creating crossed referenced ignorant public articles written by cubical commandoes whose only real skill is creating google search interlocking fields of fire.

General Mike Hostage (F-15 and F-16 Fighter Pilot) the past commander of the US Air Combat Command (ACC) made the effort to qualify in the 5th Gen F-22 Raptor could put a very credible marker down for the public debate in our Breaking Defense article:

"I was fortunate to fly the airplane (F-22); I learned what I didn't know. I was writing war plans in my previous job as a three-star using the F-22s in a manner that was not going to get the most out of them that I could've because I didn't truly understand the radical difference that the fifth gen could bring.

"People focus on stealth as the determining factor or delineator of the fifth generation. It isn't; it's fusion. Fusion is what makes that platform so fundamentally different than anything else. And that's why if anybody tries to tell you hey, I got a 4.5 airplane, a 4.8 airplane, don't believe them. All that they're talking about is RCS (Radar Cross Section).

"Fusion is the fundamental delineator. And you're not going to put fusion into a fourth gen airplane because their avionic suites are not set up to be a fused platform. And fusion changes how you use the platform."

Picking up the viewpoint from the Navy's Director of Air Warfare, Rear Admiral Michael Manazir USNA '81 another cold-then hot war- fighter pilot flying F-14s then the F/A-18 one can see the unity of vision and purpose driven by the introduction of the F-35, while also recognizing the specific challenges that each of the US combat aviation services face.

"It is about how the sea services overall were being transformed by the ability to work more effectively with the other US services and other nations. Too often in defense discussions, focus is on a particular platform — a ship, a plane, a vehicle — and not on how new platforms work with what we already have to enhance the force as a whole.

"What the Ford-class, the Joint Strike Fighter, and future unmanned platforms bring is the ability to pull the information in and be an epicenter of an enlarged and extended reach for the joint and coalition force.

"With its ability to push data back to the ships and across the international coalition of F-35 operating nations, the F-35 is more than just a new strike fighter: It is part of fundamental change in the way the sea services operate across an extended, integrated battlespace."

In building a body of knowledge at the pilot level, Marine leadership joined forces with the visionary Secretary of the Air Force Mike Wynne and COS Buzz Mosely, who in partnership with AF Chief General

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Buzz Moseley (F-15 Fighter Pilot) created a special flying billet in an F-22 Raptor Squadron for a Marine Fighter Pilot Lt. Col. Chip Burke.

The Honorable Mike Wynne, Secretary of the USAF together with General Buzz Moseley Chief of Staff working with the full visionary support of Lt-Gen George Troutman, Deputy Chief of Staff Aviation, USMC to put a non-USAF pilot into an F-22 to jump start USAF thinking and to gain better joint force understanding the transition.

Lt. Col. Berke was a key player in that effort. A USMC Squadron Fighter Pilot, he went to Nellis to train on the F-22. Lt. Col. Berke was then the F-35B squadron commander for the USMC at the 33rd FW Eglin AFB, and is the only F-22 and F-35 pilot in existence. His background is truly unique. Lt. Col. Burke was also an F/A-18 Carrier Qualified Fighter Pilot, a Top Gun F-16 instructor pilot and also served on the ground in combat with the US Army.

Secretary Wynne and Chip Burke had a seminal meeting and discussion at the F-35 initial "school house" Eglin AFB where the first F-35, USMC, USAF and USN Squadron pilots were being transitioned to the Lightning II.

As Wynne explained:

"Finding the enemy, fixing the enemy, and destroying him is a fleet task, not the individual aircraft or squadron. What's going to happen now is we're going to go up there and find the enemy, and assign it away.

"This affects training because we now need to train pilots to think from the standpoint of command and control so the training approach would need to modified as the training became more advanced.

"How do you begin to start the process so that when they get to advanced pilot training that they really understand that one of the things that they're going to have to learn is this core syllabus is going to take them into a command-and-control ops, rather than that of the traditional fighter pilot."

And that is exactly what is happening at the Marine Aviation Weapons and Tactics Squadron One, Yuma, with the USAF Weapons Schools and home to Red Flag at Nellis AFB and the Naval Strike and Air Warfare Center, NAS Fallon.

As previously mentioned, a key intangible that should never be underestimated for combat success, is the source of instructors during a squadron pilots combat training 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 Fighter Pilot 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.

In the summer of 2015 the USMC declared VMFA-121 'The Green Knights "IOC with the F-35B and thus that fighter squadron became the first operational F-35 combat squadron in the world. Commandant of the Marines, General Joe Dunford, who is now Chairman of the Joint Chiefs of Staff announced IOC:

"VMFA-121 has ten aircraft in the Block 2B configuration with the requisite performance envelope and weapons clearances, to include the training, sustainment capabilities, and infrastructure to deploy to an austere site or a ship. It is capable of conducting close air support, offensive and defensive counter air, air

interdiction, assault support escort and armed reconnaissance as part of a Marine Air Ground Task Force, or in support of the Joint Force."

Interviewing Lt. Col. Gillette the first Commanding Officer of 121 while he was transiting to F-35 by standing up the Marine F-35 training squadron, VMFAT-501, Warlords, at Eglin AFB, he stressed the importance of combat experience to shaping the approach, which the jet will follow as it, is integrated into USMC operations.

"The USMC with its experiences in Libya, Iraq and Afghanistan certainly has logged significant understanding of how combat jets are used to support the MAGTF and ground forces overall.

"The warriors are bringing the war to the airplane. The airplane is not going to war for the USMC by itself. In other words, operational experience precedes the F-35 B and it is being melded into this new piece of equipment.

"This experience of the past decade is being taken forward into the next and will be an important part of shaping the operational approach for the first decade of the F-35B and its experience with the USMC.

"The ability of the airplane to ingest information from all different sources, fuse it, will now level the playing field to some extent between the seasoned flight lead, who is doing the communication with the guy on the ground, and the rest of the squadron.

"The plane will immediately transmit all the situational awareness built into the plane and provide it to the least experienced member of the flight squadron. And that will happen just like that."

The key to the future, as demonstrated at Yuma is to put the F-35B in the hands of the operators.

The pilots of VMFA-121 are working very closely with USAF pilots as the Air Force prepares for its IOC in 2016, fellow Naval Aviators in the USN are also clearly involved

As Major Summa, the Executive Officer of VMFA-121 at Yuma, who is now LtCol Summa CO of VMFAT-501 at MCAS Beaufort SC, put his Squadron/MAWTS learning in a joint service perspective;

"Working with the other service pilots provides an important window on where we want to go with the concepts of operations of the aircraft. We have different backgrounds, Harrier, F-18s, F-16s, F-22s, and F-15s, but we understand that given the commonality of the aircraft these different backgrounds suggest common ways ahead. We are all able to contribute to the way ahead for a common aircraft.

"And already some very different ways of operating are suggesting themselves.

"Historically, there is a one to one relationship between combat aircraft and mission support aircraft in doing certain types of initial insertion missions.

"With the F-35 and its combination of stealth and fused combat missions we can reduce dramatically the need for mission support aircraft in initial operations. For example, a non-kinetic electronic warfare option is one button push away."

The co-location of VFMA-121 with MAWTS-1 is an important part of the introduction of the aircraft.

While VFMA-121 is now operational, MAWTS-1 is responsible for the tactics and training for USMC aviation. F-35, MAWTS instructors are flying with VFMA-121 to shape evolving concepts of how to standardize fleet operations for the new aircraft.

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As a former CO of MAWTS-1 then the Commanding General of 2nd Marine Air Wing, Major General Robert Hedelund put it: "VFMA-121 will figure out how to kill the enemy more effectively and MAWTS will standardize the approach."

And soon very soon Allied Air Forces, along with more USMC, USAF and USN F-35 Fighter Squadrons will be standing up and reaching IOC. All F-35 Fighter Pilots will be part of a global combat enterprise, unified but diverse, in full partnership such as the world has never seen before.

AND it all begins with trained squadron pilots.

SHAPING THE KILL WEB: THE IMPACT ON DESIGNING THE USN FLEET

01/20/2019

By Ed Timperlake

There is a great US Navy quip about a surface combatant: "Captain we are underway with no way on."

This saying is essentially reporting that the ship is trying to go forward but it is stopped by currents or other forces and drifting.

In a very insightful article recently published by USNI and written by Megan Eckstein, she perfectly captures a Navy leadership dynamic that tells friend or foe that the US Navy certainly has "way on" into 21st Century war.

The insights presented by Rear Adm. Ron Boxall (OPNAV N96) and supported by CNO Admiral John Richardson with solid industry dynamic support is a real signal to all that in the grand historical tradition forward from the Navy's first "6 Frigates" to this day and into the future, the fighting Navy is designing scalable forces at sea that can win today and tomorrow anywhere and anytime in any Ocean.

First of all, Admiral Boxall underscore: "The future surface combatant will not be called a destroyer.

"The Admiral wants to get away from viewing the future ship as a one-for-one replacement for today's Arleigh Burke class, and the narrative of "large surface combatant" and "small surface combatant" forces the Navy to think about designing and operating the two in tandem."

Second, he emphasized that "Chief of Naval Operations Adm. John Richardson has demanded flexibility and adaptability from the future large surface combatant, and the Flight III design cannot deliver."

Welcome to US Navy "Kill Web" thinking, where no platform fighting alone in the air, on the surface and sub-service forces all together going into the future.

"We shouldn't look at ship to ship; we should look at the force.

"And I would argue that I think we can get more bang for the buck out of our force out of these lethal small frigates I'm very excited about," Admiral Boxall said.

The dynamic of ship design has been in an historically different cycle time from that of combat aircraft design trends.

The driver in aviation R&D was simply a quicker airframe technology action reaction cycle.

Now with a 21st Century technology sensor/shooter and payload utility functions driving Kill Webs, ship and aircraft design improvements are converging.

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

The American 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.

The dynamic of shifting to technological improvements in both aviation airframe design as with ship hull design must be undertaken with a vision for growth into unknown capturing battle tipping dynamic sensor/shooter improvements over time.

The crossover point in melding N96, surface focus with N98 Aviation is the late Col. John Boyd USAF fighter pilot in meeting today's Surface Navy

To understand Payload utility 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.

Effective employment of a Payload utility (Pu) function in combat can be seen as the end point 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, because numbers also do count.

The CNO and Admiral Boxall well understand the Payload utility dynamic for the next round of shipbuilding.

Thinking about building a scalable interconnected fleet of many air and sea assets to fight and win is captured perfectly in the USNI article.

Every peer-competitor that can become an enemy of America and the American Navy must understand the lasting words of the great Navy theorist Alfred Thayer Mahan, of whom John Keegan called "the most important American strategist of the nineteenth century.

"Mahan made a seminal point about fighting a war that rings true to this day, and specifically note the emphasis on "offensively and aggressively":

"War, once declared, must be waged offensively, aggressively.

"The enemy must not be fended off, but smitten down.

"You may then spare him every exaction, relinquish every gain, but 'til then he must be struck incessantly and remorselessly."

FIGHTING AT THE SPEED OF LIGHT: MAKING IT ALL WORK

Second Line of Defense

05/20/2019

By Ed Timperlake

Honoring, and empowering humans engaged in the deadly serious occupation of defending their fellow citizens as combat warriors in putting their life on the line is everything in a military analysis before any future technology discussions can begin.

It is no good to talk about future technologies without starting from the nature of warfare and of human engagement in that warfare.

Often looking at ground battles from the earliest recorded days, the forces engaged had a simple guiding rule — kill the enemy in greater numbers.

There is no hard and fast rule from history of what tips a battle one way or another except one core principle: with the will and means to continue to degrade one's opponent winning is enhanced.

The great quip often credited to Grantland Rice who gives full credit to a fellow sports writer comes to mind;

As Hugh Keough used to say: "The race is not always to the swift, nor the battle to the strong; but that is the way to bet.

Such insights actually are biblical from The King James Bible (such poetic writing):

"I returned, and saw under the sun, that the race is not to the swift, nor the battle to the strong, neither yet bread to the wise, nor yet riches to men of understanding, nor yet favor to men of skill; but time and chance happened to them all."

At the most basic Payload Utility function, the key to combat success since the dawn of warfare is captured in a very simple example — the great command of learning the very basic art of accurate marksmanship.

"Ready on the Left Ready on The Right-Already on the firing line" and with that every Marine is trained in the use of their rifle.

Once trained and retrained and retrained until actual combat because their skills are never allowed to atrophy the individual Marine has a direct engagement using a very simple payload utility function in shooting the weapon.

The combat utility of the basic rifle is acquiring the target and then accurately engage to kill the enemy.

That type of engagement at the basic infantry level is no different than the senior Generals and Admirals having their fighting forces acquire and engage targets using many different mixed and matched payloads.

This universal way of war is often correctly referred to as combined arms, as layer after layer of direct and indirect fires, kinetic and non-kinetic, weapons are engaged to defeat the enemy.

I created a short hand phrase "Tron" war for that spectrum of non-kinetic offensive and defense weapons integrated together.

In fighting against a reactive enemy in a larger battle, the aggregation and disaggregation of sensor and shooter platforms with no platform fighting alone is the commander's goal.

Making it all come together effectively is the challenge.

The infantry squad leader directs his combat force by pre-briefing, briefing and then direct voice commands to maneuver his fire team elements during the very confusing heat of combat, often accurately called the fog of war.

Using voice commands since biblical days is fighting at the speed of sound it is up close and personal.

However, with early electronic devices, for example the Civil War telegraph, the platoon leader concurrently reached electronically up and down the chain-of-command to be part of a greater focused unity of purpose combat force.

Commanders at the highest level have to keep both cohesion of the combat engagement mission by effective communications, while concurrently relying on all to engage intelligently relying on their individual initiative to fight to the best of their ability.

Communicated information is essential.

But central as well is empowerment of the force.

The key is to ensure a maximum of capability for combat operations to be able to operate independently with accurate real time dynamic intelligence at the right level at the right time to make their combat function superior to the enemy.

Very little is different from the deck of Navy Strike force or Air Battle or Ground Commander from a Marine Platoon commander except the complexity of all the "moving parts" to be managed and employed to fight that are also spread out over very great distance.

Fighting at the Speed of Light

But after two decades of the land wars, we need to learn to fight again in higher intensity operations.

We need to Fight at the Speed of Light.

This requires that a fighting force at all levels must take advantages of ever-increasing technological advances to make decisions using the speed of light.

In other words, symbolically as the laws of theoretical physics are evolving, the test is the application phase or the success of the applied physics phase, so to speak. Nothing illustrates this more than E-MC squared to the atomic bombs that ended WWII.

With advances in all forms of "tron" war from Directed Energy, to Cloud Computing to Artificial Intelligence to robust encryption, many building block mathematical algorithms are now assisting the process of generating accurate and timely information in making the step from being theoretical to becoming applied.

At the moment battle begins, command and control is essential and has to have several attributes.

First and foremost, accurate information has to flow through robust redundant systems at the speed of light in making everything come together to fight and win.

The infantry platoon commander trusts the training and combat effectiveness of each Marine to do the right thing using initiative in following orders in the heat of battle while also trusting higher commands to provide supporting arms, including air, to get it right and at the right time.

Second Line of Defense

The communication and intelligence capability in this 21stCentury evolution/revolution of global coms is the connective tissue for human decisions with how to conduct successful operations and to use payloads effectively at the speed of light.

This where the capabilities begin to come together.

The future is now because from today "zero day" to five years out, there is sufficient insight to merge the human combat brain functioning with existing and near-term technology to fight and win in any combat theater.

We have highlighted the importance of the 0-5 military and the central significance of how technology is integrated into evolving concepts of operations rather than focusing on an abstract long-term future.

Recently, a senior British commander when discussing our approach referred to this as the rolling FYDP which in his view is crucial to engaging in combat operations successfully going forward, rather than abstracting waiting for the best hi tech solution some think tank could come up with.

America is blessed that many in the defense industrial base in responding to combat requirements have answered the challenge to build systems of systems inside the emerging Kill Web way of fighting, vice obsolete Hub Spoke and linear Kill Chain thinking.

First existing command and control is always against a reactive enemy a time dependent factor that is critical to force level combat.

If a commander can count having the initiative combat ops tempo over the enemy then his forces can be dynamically optimized as a coherent combat directed fighting force.

This is the challenge of effective command and control, of course ultimately the commander has to always have the wisdom and judgment to fight to win effectively.

If victory in battle could have been simple engineered it would have already been done so.

The Challenge

Given competent and skilled commanders there are two qualities of a fighting force that are needed for the force to derive the full capabilities of its weapons systems.

The first is motivation or dedication, or call it; will, heart, ambition or competitiveness. It is the quality that makes fighting personnel appear enthusiastic rather than lackadaisical or dispirited.

The second is a forces technological capability which is the ability at the appropriate level to have the capacity to understand and operate the rather sophisticated equipment associated with modern war.

Marrying force motivation with technological capability allows a superior force to achieve combat performance over the enemy. It is a combination of appropriate combat equipment at all levels of any engagement operated by trained individuals. Inventory of weapons systems and platforms, including sufficient munitions at the start of a war can make all the difference.

The time factor of both battle damage repair with any possible industrial surge and sufficient logistical supply/resupply while ensuring a pipeline of well-trained individuals from E-1, basic initial enlisted rank to 0-10, Admiral or General is simple to identify but a huge challenge to get it so right at the time of initial

conflict. Trained humans matched up to technology is an obvious statement and makes all the difference as a combat campaign progresses.

The biggest challenge in the rapidly exploding human/information dynamic in this 21stCentury challenge of modern war is the ability to have all make accurate decisions using light speed technology.

The Big Three

The emerging "Big Three" of 21stCentury Tron war are: Cloud Computing, Artificial Intelligence and ever advancing encryption technology.

There are many appropriate technological stovepiped research applications which can be drawn upon to shape a dynamic integrated capability.

Cloud computing, Artificial Intelligence and secure encryption are very appropriate research areas unto themselves. There is also the need to be ever technology and con-ops vigilant for a counterpunch combat challenge of a reactive enemy always working to deny their enemy's (US) successful employment of our Big Three while protecting the development and employment of their own.

Remember it is not just about the money but it always about the money.

CLOUD COMPUTING

Cloud Computing R&E with the recent sole source DOD contract of Ten Billion awarded to Amazon comes at just the right time. Such a massive influx of R&D money if managed smartly will make a significant difference to advance US military cloud computing capabilities.

American military test and exercise planners can easily horizontally intellectually work inside emerging Cloud, Kill Webs, with the template of the payload utility function of multi-domain, multi platforms sensors and shooters with no platform fighting alone.

Combat Cloud research and engineering can be tied together as a global enabler to fight at the speed of light.

Success in building testing and using cloud computing emerging capabilities can become a significant component of a combat force engaged in stopping a strategic nuclear attack delivered by hypersonic weapons at all levels of threat-from space and atmospheric maneuvering glide to sub launched HSCM.

The potential of ready secure data being interactive at all levels of command is an intriguing concept. The theory and execution of "Kill Webs" by the U.S. Sea Services shows great promise.

The US Navy has pioneered the Kill Web concept versus the kill chain, with the latter reflecting linear thinking.

A global Combat Cloud built as a secure, robust, and redundant go to source of data-based decision making at light speed can provide useful warfighting networking and intelligence sharing concurrently in and out of each combat theater.

This potential real time combat dynamic learning at all levels of command and when needed capability is central to the way ahead.

This will allow directed combat action sensor/shooters delegated down to all and will be very significant at all levels of force engagements.

Second Line of Defense

In other words, successful cloud research is tailor made to have scalable forces operating around the globe using the same data base.

ARTIFICIAL INTELLIGENCE

Artificial Intelligence (AI) is rapidly approaching fleet wide empowerment to make truly actual speed of light decisions. It is not necessary to try and integrate AI into diverse military utility functions because it will most definitely find its own way in.

The Defense Advanced Research Agency (DARPA) is championing AI research.

For more than five decades, DARPA has been a leader in generating groundbreaking research and development (R&D) that facilitated the advancement and application of rule-based and statistical-learning based AI technologies.

Today, DARPA continues to lead innovation in AI research as it funds a broad portfolio of R&D programs, ranging from basic research to advanced technology development.

DARPA announced in September 2018 a multi-year investment of more than $2 billion in new and existing programs called the "AI Next" campaign.

What should not be overlooked by DOD and, specifically DARPA, is the fact that Medicine has been pioneering many dimensions of AI, with significant research investments. Although HIPAA privacy rules and DOD Classification protocols are different, they both have a very similar issue to deal with: to guard the sanctity of data and there are significant penalties in each system. Violate HIPAA and there can be significant private sector law suits. Violate the sacred trust of one's security clearance and it can be a career ending mistake at a minimum.

So far, the differential in research money between Military AI research and medical AI research greatly favors medicine

"Healthcare Artificial Intelligence Market to Top $34B by 2025"

This would suggest that learning from what currently exists in medical AI should most definitely be part of any important DARPA research way ahead.

The global market will rise to the challenge of synthesizing massive volumes of big data though machine learning techniques, including deep learning, semantic computing, and neural networks, according to the report.

Key clinical and operational areas will include medical imaging analytics, drug discovery and clinical trials, clinical decision support, natural language processing, biomarker discovery, and patient management.

Software developers seeking to address these use cases are likely to see $8.6 billion in annual revenue by 2025, contributing to the $34 billion total in software sales, hardware installations, and consulting opportunities within the AI market.

(Note Medicine is already integrating AI and Cloud Computing)

Cloud-based solutions accounted for the largest segment of the software and service market in 2017, and are likely to continue to grow in popularity as organizations seek speedy, low-cost options for deploying and maintaining health IT systems.

Two examples of AI in a health care applications touch on just two of countless lessons from a community spending billions of dollars already.

First, a paper on deep learning and a computer vision in which deep learning can outperform humans' highlights research in the health field of relevance to defense.

Examining the use of AI for Imaging in Clinical Care

Aalpen A. Patel, MD, Chair, Department of Radiology, Geisinger Health

"In recent years, deep learning has revolutionized the field of computer vision. In ImageNet competition, deep learning models are now outperforming humans in object detection and classification. In medical imaging, deep learning has been used in variety of image processing tasks such as segmentation and in recent years, for diagnostic purposes such as diabetic retinopathy and skin cancer detection using large medical datasets.

"More recently, we have published a paper describing DL based identification of intracranial hemorrhage on CT scans of the head and using it to prioritize the list for interpretation.

"We believe that using large clinical grade, heterogenous data set is extremely valuable in generalizing and translating to clinical tools. This is just the beginning – combining all the -ologies, -omics with imaging will lead to insights we have not had before."

AND this is a universal dynamic as DOD research moves forward:

Avoiding Hype and False Conclusions About AI in Medicine: Key Concepts and Examples

Mike Zalis, MD, Associate Professor of Radiology, Harvard Medical School

"With advances of machine intelligence in healthcare, key stakeholders risk suffering from an inflation of expectations and misunderstanding of capabilities. This talk will summarize key conceptual underpinnings of machine learning methods and discuss academic and industry implementation examples of AI in healthcare. The goal of this talk is support participants in adroit critical thinking as they face potential applications, initiatives, and products involving AI in healthcare."

ENCRYPTION

Ever improving encryption technology can take many different research paths and often can create as much confusion as enlightenment.

Just one example of interesting research paths this is building a "Security Token"-

One example of dynamic possibilities in this field can be ways to leverage encryption technologies from the Bitcoin world.

This is but one example of many was to encrypt data-based information. I am not engaging in the Bitcoin money fight-just the proof of concept of using block chain math potential for national security information secure transmittal research.

One should always be mindful of a word of warning from a man owning 10% of all bitcoins in the world of the damage of a very early bad start; never make a Security Token-as brutally said by the owner of 10% of all bitcoins is in the world a "Shit token" inside a corrupted ecosystem. The key is always "trust of information" in any ecosystem.

Second Line of Defense

A "value" of bitcoins is obvious, when thought about, is that in the actual creation process it is not just "value" but it is also a standalone unique "nugget" of information.

The mathematical protected uniqueness of each bitcoin now may highlight a way of transferring classified information flow in 21st Century war fighting enterprise.

Instead of focusing on "bitcoin" as a unit of value which is a very real attribute, think of creating mathematically unique "nuggets" that when 'spent" are used to "buy" or actually access classified information.

Thanks to a Cornell Professor's research using a unit of Block-chain math in perhaps securely fighting at the speed of light has had a brilliant proof of concept.

Intel's core idea allows users to run their code unmolested in a secure enclave. That means both ends of a transaction have the same constraints.

"Normally you don't know what the computer on the other end of the relationship is going to do," Sirer says.

"You have no idea what code they're running or what kind of adversarial behavior they could engage in, so you have to write your protocols in the most conservative manner possible.

"But with this technology, you know exactly what code the other side has, and you're assured the person cannot change or violate the integrity of that code.

"This allows us to build mechanisms on top that are much more efficient."

In a test, Sirer and his colleagues set up a Teechan channel between Imperial College in London and Cornell University and sent transactions across the Atlantic at the blistering fast speed of one-one-hundred-thousandth of a second

Shaping a Way Ahead

The senior leadership challenge in defense is to foster and accept innovations generated within "stovepipe" fielding processes from vertical IR&D to R&D to requirements and to engage in cross-learning. It is not enough to introduce innovation in the individual sectors,

The challenge and the opportunity to empower decision making at the speed of light by shaping integrated C2 drawing upon these technologies in the big three areas of innovation.

Rather than chase individual emerging technologies such as the Cloud, AI or encryption it is much more productive to immediately begin the "applied physics" phase of crafting experiments for dynamic iterative solutions that allow all to constantly learn how to fight at the speed of light.

Each of the "Big Three" has its own R&D dynamic so having an open dynamic testing process can accommodate each technology's current practical demonstrated capability — all constantly integrated together in an open loop learning but operational cycle.

Accurate, timely, target acquisition and target engagement leading to payload utility success from the heavens to under water is the goal.

Shaping success is ongoing con-ops learning process success is found in the Nike saying of just do it.

It is not about simply discussing technology in isolation.

As the cloud comes on line, we can embrace it as a dynamic way to share information.

As AI improves in many situations, the human factor can be successfully taken out of the loop. One huge caution in that there is both promise and danger in getting AI correct to consider never having a totally closed loop AI engagement process.

Encryption is a wondrous field of research and mathematical advance are being made every day.

For the most advanced military forces in the world, the most practical way to learn to fight at the speed of light begins just like the first command a private hears "Ready on the Right Ready on the Left, with the boundaries of being ready on right and left incorporate global engagements with all weapons.

The command "Ready" can begin on instrumented training ranges. Not only is training for training sake essential, but just like the individual Marine sees exactly where his rounds have hit the target.

The real time data collected on instrumented ranges is everything for enragement improvements at all levels.

Feeding back the captured range data results in trying to make accurate payload decisions at light speed can accelerate all aspects of future combat success.

Hard data from instrumented ranges is the most essential building block of marrying human capacity with their ever-improving force technological adeptness.

For all who want to successfully fight at the speed of light, they are only limited by their imagination on how to mix and match offensive and defense engagement exercises on instrumented ranges.

One simple example, one could deploy staggered F-35s on station hundreds of miles apart integrated with advanced Hawkeyes, UAVs and active AEGIS ships and then run very fast low-level bogies with a minimum RCR signature at them from hundreds of miles away.

Then clock the ability to safely pass target acquisition and then weapon engagement data against such a threat.

Finally, begin to include Space Assets after testing integrated "air-breathing" systems. I suspect Space is nice but might not be the panacea all believe it can be in the year 2030.

After such a series of engagements break the problem down to simple questions with the focus being only technology available specifically in a 0-to 5 years out year time horizon with a rolling FYDP being created.

In short, the future of combat is very high right now and it is essential to deal interactively with these various dynamics:

Will Combat Cloud research help?

Will AI make a difference?

Is encryption of data essential?

How can various platforms mix and match weapon payloads?

What is the current and five year out use of space-based systems?

Do all types of UAVs help?

Second Line of Defense

What difference does ever improve Directed Energy make?

If the threat comes from below the surface, on the sea or land or screaming from space, where does existing technology come together and where are deadly seams for an adversary to exploit?

If a very fast set of bogies, one R&D team suggests several F-104s as adversary, what is similar with low flying Mach 1+ targets to being different from hypersonic incoming warheads going a mile a second.

With that initial lower Mach data collected than asked the above questions again and again and again, so successful ways ahead will be discovered by integrating in considerations of HSCM and advanced BMD (including hypersonic maneuvering glide warheads).

Eventually the research and testing are for both Live Virtual Ranges and computer simulations.

But nothing should take the place of first learning by doing in building from limited in geography operations to the very large global combat.

With respect to U.S. test ranges, the East Coast military Warning Areas are perfect, eventually Allies can be part of learning by doing.

Four distinct possible combat global areas could be considered to eventually test proof of concepts between US and Allies while building stronger integrated combat Kill Webs;

The round two of suggested research, after limited test range experiments is to acknowledge the global geography of threats being both similar and different all with the common threat of escalation into a potential nuclear weapon exchange.

Looking at potential flash points of global threat areas that the American Military has can be seen in four “wicked” combat theaters anyone of which can escalate to major tactical and strategic use of Nuclear Weapons.

- South China Sea
- North Pacific
- Nordics
- Battle of the Atlantic.

My personal opinion is research will demand better quicker longer reach payloads as the most pressing challenge.

America might have to go back to the future in looking a very low yield Nuc warheads.

But that is a national debate, including all Allies, fraught with much political danger but it still may be considered as the most productive way ahead to save a Navy Carrier strike force.

A Nuc is one heck of a Payload Utility function.