The Integration of the F-35B into USMC Operations

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Tactical Innovations and Strategic Options

This is the latest in a series of Second Line of Defense reports on fifth generation aircraft, and the shaping of fifth-generation enabled combat operations. The testing onboard the USS America as well as the work of the squadrons at Yuma USMC Air Station, namely, MAWTS-1, VMX-1, VMFA-121 and VMFA-211 is highlighted.

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TACTICAL INNOVATIONS AND STRATEGIC OPTIONS

Second Line of Defense

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INTRODUCTION

This special report provides an update on the introduction and integration of the F-35B into evolving USMC operations. With the significant change introduced into the amphibious fleet and for USMC land based operations by the Osprey, the F-35 B is accelerating the transformation of the CORPS into a wide-ranging insertion force able to operate across the range of military operations.

The report begins with an update on the recent testing onboard the USS America with regard to the F-35B with the Osprey onboard as well. We then turn to insights provided from Yuma Marine Corps Air Station by MAWTS-1, and the two operational F-35 squadrons, which have been based there. The Green Knights or VMFA-121 is on the move to Japan and will go back to the origins, namely Pacific operations.

We will then conclude with a series of articles, which look at the impact of the integration of the Osprey and the F-35B on the sea base and the evolving strategic options, which are emerging along with the tactical innovations of the new force. The ampbhious ready group is being transformed into an amphibious task force, which is highly "Integratable" with air, and maritime based combat forces which together will shape what the US Navy leadership refers to as a kill web.

In short, although the F-35 is an innovative piece of combat technology it is its interaction with other key elements of innovation, which are opening up new capabilities and options for an integrated air and maritime force. And closely associated with the Marines in all of this is the UK, which is a core participant from the ground up in terms of integrating the F-35B with their new sea basing capabilities as well.

If there is a political will to build up the US Navy ship numbers, no better investment can be made than in the ampbhious fleet where the sea base is experiencing a revolution. Investment in new amphibious ships coupled with the investments in Ospreys, F-35s and CH-53Ks will provide US leaders with significantly expanded strategic flexibility and tactical operations.

THE MARINES ONBOARD THE USS AMERICA: THE REMAKING OF THE AMPHIBIOUS STRIKE FORCE

By Todd Miller

12/4/16

"We'd always say 'if its really a bad air to air (A2A) threat, get some additional jets up there, get some more capability.'

I have no pause or hesitation that this jet will dominate in an A2A environment, would dominate in a strike environment, dominate in a CAS environment, and would also do a very nice job in an electronic warfare realm as well."

Marines. At their mention I suspect most think, "storming the beaches." Amphibious vehicles first in, troops storm ashore. That capability still exists, but today there is a far greater capability, one that will provide a vexing challenge for any adversary.

Already transformed by the mobility of the Osprey, the F-35B offers a critical upgrade to the Marine Air-Ground Task Force (MAGTF) and amphibious assault. The first wave is no longer limited to the beach or uncontested space, it can effectively reach locations 450 miles from the shipborne base – even in contested airspace.

What once came ashore like a wave, now comes as lightning strikes in a violent storm.

Marines on the beach, Marines from behind, and Marines within the adversary's territory. Marines striking swiftly with maximum effect to deal with high value targets, including terror cells – all with the stand alone capability to do so.

This is the "Aerial Amphibious Assault" Force, and these are the Marines of the 21st century battlespace.

It is a capability the US Marine Corps (USMC) has patiently and steadfastly build towards, and the pieces are coming together;

Integration with the US Navy LHA Class Amphibious Assault Carrier – The USS America & USS Tripoli (under construction). The LHA class offers enhanced \ dedicated support for Marine aviation assets.

MV-22B Osprey. The Osprey offers extended range and speed for troop insertion, as well as air to air refueling support.

Existing Attack Helicopters (UH-1Y Venom & AH-1Z Viper).

F-35B Lightning II. The F-35B replaces the AV-8B, F/A-18 Hornet & EA-6B Prowler. The aircraft offers exceptional performance Air to Air (A2A), Air to Ground (A2G), Close Air Support (CAS), Electronic Warfare (EW), Command, Control, Communications and Computers (C4), Intelligence, Surveillance and Reconnaissance (ISR) all with the capability to operate stealthily within contested areas.

CH-53K "King Stallion" When introduced (2019) the CH-53K will provide nearly 3x the heavy lift capability of the CH-53E.

The USS America (LHA-6) is a maritime base which provides unrivaled flexibility.

Park it where you want in international waters. Forward deploy it to a region for any contingency, and a Marine Expeditionary Unit (MEU) is at the ready. The LHA platform is ideal for military operations involving troop insertion, (anti-terrorism activities) where the objective is to infiltrate, accomplish the mission and leave no boots behind on the ground.

The LHA offers the flexibility to adjust mix from heavy jet (F-35B) to heavy tiltrotor (MV-22B) or rotor wing. Utilizing the MV-22B and the F-35B, the USMC can effectively insert troops 450 miles from the ship in under 2 hours.

The platform offers the flexibility to work together with additional amphibious assault carriers (LHD) when amphibious vehicles are desired, as well as with the support of the USN Supercarrier.

Not a replacement for either, the LHA provides flexibility for the military to tailor a force most suitable for the mission at hand.

Second Line of Defense and a handful of gathered journalists recently had the opportunity to visit with Lt. General Jon "Dog" Davis, USMC Deputy Commandant for Aviation, and Col. George "Sack" Rowell, Commanding Officer of VMX-1 (Marine Operational Test & Evaluation Squadron).

The visit took place after DT-III, during a "Proof of Concept" demonstration on the USS America, November 18-20, 2016.

General Davis, can you describe the tactical implications of the USS America with F-35B, MV-22B & other Marine aviation assets?
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The MV-22 is an incredible platform, it can go a long way at a high rate of speed, it can receive air refueling, and it can be configured to provide air refueling.

It can move Marines, and (configured) it can pass fuel to other MV-22's or F-35s. That is a tremendous capability for the Marines and the Naval services.

These ships are designed for amphibious operations, MAGTF operations with the standard mix of Marine units that will go out (Marine Expeditionary Units – MEU), but occasionally we need to configure this to be jet heavy or helicopter heavy. In this case, this is a jet heavy deck. We could take up to 20 F-35Bs onboard, we put 12 on this time.

This is a 5th Gen strike capability that the nation does not currently have from a sea base. It is a tremendous capability. We had Vice Admiral Rowden (Vice Admiral Thomas Rowden, Commander Naval Surface Forces) onboard today.

FIGURE 1 USMC LT. GENERAL JON "DOG" DAVIS, DEPUTY COMMANDANT OF AVIATION, ABOARD THE USS AMERICA DURING THE F-35 B PROOF OF CONCEPT DEMONSTRATION, NOVEMBER 19,2016. CREDIT: TODD MILLER

One of the things we did as part of this test was the AEGIS integration with the F-35B. That's a big deal. That's a big deal for our Nation, our Navy and our Marine Corps.

The Marine Corps is a force that fights across the range of the military operations, and this could be something that a combatant commander, or a fleet commander decides that we need to be able to do for a time.

Like we did during Operation Iraqi Freedom, where I think we had 4 decks loaded up with Harriers. We sailed over with helicopters on board and then flew Harriers in and flew off those ships because that was the best way for us to operate.

Practically speaking, what is the operational range from ship of the F-35B/MV-22B tandem?

Unrefueled you could do 450 miles, refueled, you could do more. MV-22s are an incredible platform for assault, delivering Marines or for getting Special Operations forces where they need to go. The F-35B is a very nice complement to get that MV-22 into a contested area.

If I was a bad guy I would hate the MV-22. If you hate the MV-22 you want to try and go after it, and the F-35 will create the conditions for the success of the MV-22.

It will sanitize a target area, go after target defenses, provide close air support for the assault force in the objective area and then help bring them back home, utilizing A2A, A2G, situational awareness and electronic warfare.

We think we have a real winner in the combination of platforms out there, but it is not just about F-35Bs & MV-22s. We have attack helicopters, UH-1Y, AH-1Z, CH-53Es and soon we'll have the CH-53Ks.

The most important part of all is the young marines that are supported by a ride in those aircraft and get supported by these weapons systems.

The F-35 weaves a lot of things together that we have not had in a long time. EW for our MEUs which we've never had before in this kind of capability; a very, very high end air defense and counter air capability; and an all-weather ground attack CAS system that allows us to provide CAS in virtually any environment out there.

We are very pleased with what we are seeing. And this is a beautiful new ship. It's my first time on the America, and I am very impressed with the ship, and I am really impressed with the sailors, and their attitude. The Marines are beaming, and the sailors are also very happy.

We're talking about deployments in 2018, would you feel confident if you had to deploy to a CENTCOM AOR Firebase?

I'd do it tomorrow. Tomorrow.

The squadron commander (CO) of VMFA-211 is chomping at the bit, he would deploy them, so would the CO of VMFA-121. They are ready. These airplanes are highly capable and ready to go.

We have a commitment to move to Japan with VMFA-121. As Marines we live up to our promises.

We have promised to take 5th Gen capability to Japan, so we're doing that. And we are going to do that in January.

We will deploy on timeline with these other capabilities unless something requires us to go sooner or faster. They are ready. They are ready. The Marine Corps is busy right now, so I'm not trying to put anything else on anybody's plate, nor is anyone else.

But the nation has a 5th Gen capability that can operate from a sea base, and could do it tomorrow if need be.

As you debate how to tackle a contested area, and operate in a multi-domain environment, and highly dispersed units, it sounds as if the F-35 are they key to that, how?

Absolutely.

We are operating on a sea base right now. This is a great platform to operate from. It makes the sea base more powerful, more potent.

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However, we can also move to FOBs, continue to operate, then back to the ship. We have Royal Air Force (RAF) pilots out here watching this today, and that was their operational concept when I was an exchange officer with the RAF. Going from a main base to what we call distributed operations all over.

We have done that when in an A2/AD threat condition. That is a tremendous capability for the Marine Corps today.

We bought this airplane so that we could better support the troops on the ground. That means flying from whatever operating base is most advantageous from an operations perspective and threat perspective. It might be the sea base, it might be a base ashore.

The Marine Corp has units called the Marine Wing Support Squadrons (MWSS), they are the Marine Corps carriers ashore. We have the Carrier at sea, and then we have these units that create operating bases ashore.

We can move those around as need be to give us the extended reach and play if we don't have a set base or a road to operate these airplanes. Wherever you have enough road to land a C-130J and offload jet fuel, you can put F-35Bs to go operate for a period of time.

FIGURE 2 USMC COL. GEORGE "SACK" ROWELL, COMMANDING OFFICER VMX-1, PROVIDES F-35 PROGRAM STATUS DURING PROOF OF CONCEPT DEMONSTRAION ON USS AMERICA, NOVEMBER 18, 2016. CREDIT: TODD MILLER

We just did the hot rearm, hot refuel with the F-35Bs. We have been doing that with Harriers 12 years now, and we do it with F/A-18s. We did it at WTI for the F-35Bs. 2 F-35s came in and landed, we never shut them down, we refueled, reloaded them with ordinance and took off in less than 20 mins. That's a significant capability.

We are not going to hot rearm on the ship during this exercise, but we are hot refueling. We are always looking for ways to make things go a little bit faster.

We did that in Afghanistan with our Harriers, for the Marjah operation. The Harriers took off out of Kandahar, got overhead Marjah, did their CAS.

We built a small FOB called FOB Dwyer with one of the MWSSs very close to Marjah. Once aircraft dropped their ordinance, they landed at FOB Dwyer, rearmed and refueled without shutting down and took off again in about 15 mins. We made 12 Harriers look like 36 Harriers.

Now we are doing it with the F-35s.

I understand the Marines are looking to accelerate full motion video capability. When & Why (I believe it is scheduled for Block 4.3)?

I do believe we found a way to bring it on faster than Block 4.3. It's one of the things we use (actually we were one of the pioneers for streaming video out of our lightning pods) for our guys on the ground. Our forward air controllers (FACs) love using that.

I think they'll also like the other capabilities of this airplane too like the Synthetic Aperture Radar (SAR) map through the clouds. The full motion video does not provide that at all right now, it's really streaming video (not full motion video). Bottom line, if the customer wants it, we try and provide it. I believe it may be implemented for Block 4.1 or 4.2.

Can we discuss the AEGIS integration & practical effects?

I wish I had my Navy counterpart here, Admiral Rowden was very excited about it. It was a Navy idea. Col. Rowell (Col. George "Sack" Rowell, VMX-1 Commanding Officer) will you address AEGIS integration?

Rowell; The first experience took place 2 months ago with the "AEGIS" at White Sands (Desert Ship). An F-35 targeted a cruise missile surrogate and provided the targeting data to the AEGIS platform. What AEGIS really brings is a weapons payload.

The General just talked about hot loading the aircraft with weapons. AEGIS cruisers bring a weapons payload, that just could not fit on an airplane.

We are talking about dozens and dozens of missiles. SM-6s that can be targeted by airborne platforms at a much greater distance than they could independently target.

Does this fit in with distributed lethality?

Absolutely. The F-35 digitally sent the targeting data through to the AEGIS using multi-function advanced datalink (MADL) and the AEGIS shot – and that was a live shoot, a live SM-6 came out of White Sands and destroyed the target.

Are there any other aircraft that can do that?

No, nothing else (using MADL) can do that. The Navy has AEGIS cruisers all over. We establish data links with local cruisers. DT-III did everything shy of shooting the missile, established the data link, passed the data, and validated the data.

Davis; The F-35 & AEGIS are a great Naval integration story, there is a lot of potential, a lot of excitement. Not a Harrier, or Hornet, this is a totally a new and different capability. The MV-22 was a disruptive technology and it changed our assumptions about how we are going to operate an assault platform from a sea base. It also changed drastically what we do ashore.

This jet will do that for us as well, and I am proud of the Marine Corps for being up front and leading this thing. And if you had enough real estate to put as many aircraft as possible on a ship like this, there are conditions and situations where you would want to do that.

I think its primary mode will be as an amphibious ship loaded with our typical MEU capability. But there are times we would want to load up like this (jet heavy).

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This ship would normally carry 1500 Marines, with a surge capacity of 1800. Two battalion of Marines, Americas most potent weapon, the Marine Rifleman.

Can you discuss the big Picture deployment to Japan? How does tomorrows demo fit in with it?

We are investigating the right mix of assets on the ship to support the MEU. Is it 6 or 8 F-35Bs? We want a solid deployment, move out to Japan and establish normal operations as a 5th Gen platform in the Pacific Region. We've been planning for this for a long time.

I want to send F-35s to Japan and have them operate as successfully as we do in Yuma, AZ & Beaufort, SC and extend this 5th Gen capability for our forces in the Asia Pacific. I think its tailor made for that region.

It has an incredible capability, it's got great sensors, great weapons, great radars, great agility, great flexibility, and its tailor made for a dynamic region like the Asia Pacific.

Our Harriers have a set amount of capability, and we've been deploying our MEUs with Harriers but the Harrier is not as combat capable as an F-35. I mean for the full range of military operations. We'd always say "if its really a bad air to air (A2A) threat, get some additional jets up there, get some more capability."

I have no pause or hesitation that this jet will dominate in an A2A environment, would dominate in a strike environment, dominate in a CAS environment, and would also do a very nice job in an electronic warfare realm as well. And I think that we talk about higher threat systems out there.

We do a good job escorting our assault support platforms, with our attack helicopters. But our jets do helicopter escort as well and I think the F-35B is going to be one of those escort platforms that we are going to rely on for MV-22s, certainly for going into contested areas.

Can you provide an overview of the mission tomorrow, and the message it sends?

We are doing MV-22 escort with a six ship F-35B strike. Bottom line going into a contested environment, set the MV-22s down, deliver a notional group of Marines.

Airplanes are dedicated to the escort mission and strikes, some A2A and A2G. So we are practicing what we will perform for the MEU of the future.

With those final comments the interview came to an end, yet the picture was clear;

The integration of the F-35B with the MAGTF changes everything.

F-35B COMPLETES DT-III ON USS AMERICA

By Todd Miller

11/27/16

The fourth ship to carry the name, the USS America (LHA-6) serves as the flagship for a new class of amphibious assault ships that is built specifically to support "aerial assault."

The LHA class utilizes the area on assault ships typically occupied by the "well deck" to provide additional hangar space, increased are for shipborne aviation maintenance, and additional aviation fuel and weapons stores.

It was fitting that the F-35B would complete its Development Testing (DT-III) on an advanced US Navy (USN) platform named "America."

The two platforms (United States Marine Corps (USMC) F-35B Lightning II and USN USS America) represent a quantum leap in Marine aviation capability, particularly when considered in combination with the MV-22B Osprey, AH-1Z, UH-1Y and incoming CH-53K.

Pilots, engineers, maintainers and personnel from VX-23 (Air Test and Evaluation Squadron) of NAS Patuxent River, MD flew across the country with their two heavily instrumented F-35Bs for the shipboard DT-III late October through November 17, 2016.

They were joined by aircraft and personnel from VMX-1 (Marine Operational Test and Evaluation squadron) to support the maintenance phase of DT-III.

VMX-1 also participated in operational activity in preparation for the F-35Bs first shipborne deployment in about a year.

DT-III evaluated and validated the Short Take-off and Vertical Landing (STOVL) performance of the F-35B in high sea states, with full weapons loads (external & internal), with asymmetric loading (including taking off with a full load of externals, jettisoning one side and landing), live weapons and night operations.

Onboard maintenance activities involved the entire replacement of an engine, driveshaft and lift fan on one of the VMX-1 aircraft.

After replacement, the VMX-1 aircraft was flown off the deck.

USMC VMX-1 Commanding Officer, Col. George "Sack" Rowell, noted that *the F-35B will equal or exceed the shipborne operational capabilities of the AV-8B Harrier in high sea states. Flight operations took place in winds of up to 47 knots from various angles, a deck roll of 5° and deck pitch of 3°. Maintenance work was accomplished (albeit with challenges) while the ship was rolling 9°!*

DT-III was a great success achieving primary DT-III flight test points as well as numerous additional milestones for the F-35B;

- Shipborne integration of Autonomic Logistics Information System (ALIS) V.2
- Engine, driveshaft and lift fan removal and replacement aboard a L-Class ship
- Live ordnance operations with the F-35B aboard a ship (from ship to MCAS Yuma Range)
- F-35B integration with USN AEGIS validated
- Operational Test aircraft flew Block 3F software at-sea
- 1st Royal Navy pilot F-35B carrier qualified
- Joint Precision Approach and Landing System (JPALS) utilized for shipborne landing
- Use of night vision goggles (NVG) for landing
- Link-16 Integration with a variety of aircraft

The success of the tests validates the Marine Corps experience with the aircraft to date.

USMC Lt. General Jon Davis, Deputy Commandant for Aviation Marine Corps captured that experience,

I'd deploy tomorrow.

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Tomorrow.

The commanding officer (CO) of VFMA-211 is chomping at the bit, he would deploy them.

So would the CO of VFMA 121.

They are ready.

These airplanes are highly capable and ready to go."

The potent USMC/USN amphibious assault platform of F-35Bs, MV-22Bs, AH-1Z, UH-1Y and in years to come CH-53K will soon be sailing the seas.

It is natural to recognize the platforms support of a broad spectrum of military operations and missions.

However, it is important not to overlook the role the assault carriers (LHD) platforms have historically played and will continue to play; keeping sea lanes free and open for movement of global commerce, and supporting delivery around the globe of humanitarian aid following natural disasters.

The ongoing success of the USMC introduction of the F-35B fleet speaks to a certain reality.

In short order, the USS America (and companion ships) will be a foreboding presence to some and a welcome friend to others!

THE MOMENT PILOTS FIRST REALIZED THE F-35 WAS SOMETHING EXTRAORDINARY

By Todd Miller

12/06/16

Statistics, Milestones, Capabilities, Flight characteristics, Test protocols, Cost, Software blocks. It is easy to get lost in the complexity of the F-35 program.

The combined F-35 fleet now has over 75,000 flight hours, yet for many there remains a lack of understanding. Much of this can be expected given many of the F-35s capabilities are classified.

This is compounded by the reality that many do not grasp the war the F-35 was designed to deter – or fight.

Aerial warfare of the 21st century is not anticipated to consist of *within visual range* (WVR) dogfights, but rather the prevailing aircraft will dispatch its adversary without even being detected. 21st Century Warfare is defined by new terms; "Information Dominance," "Full Spectrum Dominance," "Distributed Lethality," "The Kill Cloud/Kill Web."

This warfare has about as much in common with wars of the past as your 1970's land line has to your smartphone.

It is in this battlespace that the F-35 is designed to fight and to do so with a distinctly unfair advantage.

To understand the significance and value of the F-35, and whether "it works" or not, cut through the complexity and noise. Simplify. Put aside the politicians, the ideologues, the self-proclaimed experts and listen to the voice of the pilots.

The pilots will take the aircraft into combat, their own lives in the balance as they penetrate contested space and are likely to be outnumbered by adversary aircraft.

Second Line of Defense and a handful of journalists recently had the opportunity to visit with four such pilots during a "Proof of Concept" demonstration on the USS America, November 19, 2016.

The four pilots are some of the most experienced F-35B pilots in the United States Marine Corps (USMC);

George "Sack" Rowell, Commanding Officer (CO) of VMX-1 (Marine Operational Test & Evaluation Squadron). *Prior to the F-35, Rowell spent appx. 3000 hours over 18 years of flying the F/A-18 Hornet. Previously the CO of VMFA(AW)-533*

Col. Chad "Mo" Vaughn, CO of VMFA-211. *Prior to the F-35, Vaughn spent a couple 1000 hrs over 13 years in the F/A-18A-D Hornet, as well as time in the F-16A-B Fighting Falcon/Viper and F/A-18 Super Hornet at NAS Fallon.*

Col. Rich "BC" Rusnok, slated to become the CO of VMFA-121 in March 2017. *Prior to the F-35, Price spent appx. 7 years flying the AV-8B Harrier II with additional time in the F/A-18 Hornet.*

Col. John "Guts" Price, slated CO for VFMA-122 (2018). *Prior to the F-35, Price spent appx. 1200 hrs and 10 years flying the AV-8B Harrier II, and has about 400 hrs in the F-35 over the past 3 years.*

The comments have been edited for readability with best efforts made to maintain context and integrity of intent.

As you look at the F-35s combat capabilities, what two things really mark it as either a superior or inferior weapon compared to what you have previously flown?

Mo: *The closer you get to the airplane, the more positive you are about it.*

The airplane provides awareness of what is going on around you. All around you. It is second to none.

I tell people this all the time.

I cannot tell you how awesome the sensor suite is, combined with the survivability of the airplane.

It's not just that it is a stealth airplane, it is everything rolled into one.

It makes it unlike any other plane anywhere in the world right now.

BC: *Stealth works. Low observability is not a fallacy.*

You see it in the airplane and realize what a powerful capability it is.

None of the airplanes we flew prior had that capability.

To echo what Mo said, the situational awareness (SA), the fusion piece of it stands out.

In Gen 4 aircraft the pilot is the fusion engine, what's in between your ears is what's making that fusion happen.

To some degree that's still true, the human is a major part of this weapons system.

However, the aid that the fusion system gives a pilot to make high level decisions, coupled with situational awareness well beyond what was had before – that's what makes it a game changer.

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Guts: *Situational awareness and the freedom of maneuver that stealth brings. The workload required to have that unprecedented SA is greatly reduced over previous platforms.*

I'm getting all this information, I have freedom to maneuver, and I work significantly less than I did in a previous platform to have that level of information.

That frees up my processor to be able to fight the battle vs. each individual part that I used to have to put together.

The workload is reduced in all aspects of flight, and that enables me to focus on the fight at hand.

Mo: *The aircraft allows me to be a tactician, rather than worry about physically manipulating sensors to get information I need.*

I have a good picture that I can execute tactically.

It is almost like a chess game.

I can make sure the moves I make in the cockpit are the best moves not just for me, but for everybody out there.

Can you talk a little about the AEGIS Integration?

BC: *The synergistic effects of other platforms, especially powerful platforms like the AEGIS combat system not only makes us that much more effective, they have phenomenal SA, phenomenal power and a phenomenal weapons suite.*

Sometimes we may not be in the right position, or be the best shooter – but now we can work synergistically with AEGIS and figure out that big picture.

Then we can share all that onboard information to other platforms that may or may not have the same capabilities. The integration makes us that much more effective.

We came in with Naval Sea Systems Command (NAVSEA), Industry, Big Navy to perform a demonstration in September out of White Sands, NM. The F-35 performed an engagement with that combat system through a gateway that allowed us to talk via Multifunction Advanced Data Link (MADL) to the AEGIS combat system and engage the target.

We talked electronically to the AEGIS combat system, like a remote sensor, and AEGIS engaged the airborne target successfully.

And when I say engaged successfully, it was a metal on metal engagement from a significant range. I'd say more than a tactically significant range. It was a very, very impressive shot.

That was not something we did here at sea, [it was done in September] that was a developmental test, a proof of concept, but it gives us an idea of what we can do to plug the F-35 into the bigger picture.

Can you talk about the interface for that kind of targeting?

BC: *It is super simple.*

It is targeting the way we target any of our own weapons and it is passed off.

There is really no difference, it is just a battle management issue as to who is going to engage.

Can you describe what the F-35 allows you to do from a tactical perspective that the 4th Gen platforms could not do?

Mo: *The sensors on the airplane are our center of gravity. Our ability to know what's going on around us in the battlespace and then push that to everybody we are working with.*

Not just air to air (A2A), but air to ground (A2G) as well. Add our ability to operate in areas that we have never been able to before such as contested environments.

Physically flying the airplane is extremely easy, that's the beauty of it, so you just focus on the tactical employment.

It makes you much more lethal.

Is it fair to say that your missions can become more dynamic than with Gen 4 platforms, such as loiter, gather information, be more flexible as a pilot with your mission?

Mo: *The F-16 and F/A-18 are extremely capable platforms and they do the swing role /multi role mission very well.*

However, they are going to struggle vs Anti-Access/Area Denial (A2/AD) or IADS, and in those cases they will be on a dedicated mission. We do have a lot more flexibility to flip flop missions, and we do it a lot in training. We will escort a package on a strike mission and then we will break off do some A2G, or suppression of enemy air defenses (SEAD), perhaps some Combat Air Patrol (CAP) or dynamic targeting in the target area – then we'll rejoin the package and come out with everybody.

Especially along with the F-22, we'll open the door, wait while everyone else comes in and completes their mission, then come out with the package and close the door behind us.

We do some different things.

As Marines we are on call for a number of different missions, close air support (CAS) etc. that we could not have done in one airplane.

FIGURE 3 F-35B HOVERING OVER THE USS AMERICA DECK. CREDIT: TODD MILLER

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The Marines are writing the CAS Manual for the F-35. How are you finding the F-35 in that role compared to what you have now?

Price: *In the CAS role it is performing well. Being a new aircraft there are some capabilities we'd like to continue working on, but the basic execution of CAS is "On Time, On Target."*

The jet is more than capable to execute that.

The unique capability it brings is executing CAS in the presence of a wide range of threats (something I could not do with previous platform).

Can you give me an example?

Traditionally (Gen 4) if we are executing CAS and a medium range surface to air missile (SAM) pops up on the battlefield, we are done with CAS.

We immediately transition into a SEAD, destruction of enemy air defense (DEAD), or reactive SEAD mindset. ***With the F-35, we may continue to execute CAS because of freedom of maneuver (stealth) and the SA I have about the threat, its location and its nature.***

I may advise the forward air controller (FAC) that a threat has appeared, but it won't impact mission execution. If the situation gets more threatening, I have the organic capability to go deal with the threat and then roll right back into CAS. Previously I would have to call in another platform, potentially call in our Prowlers or call in other combined arms to take care of the threat.

The F-35 enables a wide array of CAS execution in a wide array of environments, so from the low-end threat spectrum to the high-end threat spectrum I am capable of executing any of those missions.

Mo: *We have greater all weather capability.*

The synthetic aperture radar (SAR) maps give the capability to see through weather and deploy ordinance through the weather from a significant stand-off distance (or in proximity).

The ability to employ ordinance through the weather with high quality targeting is impressive.

I know every guy up here and myself included, we take a lot of pride in the fact of our CAS.

There's been much said about the airplane in the CAS role, some good, some bad, but to us it's important that a lot of that goes back to the man/woman in the cockpit and the fact that it says Marines on the back of the airplane.

It means the guys in need of CAS are going to get a level of support consistent with what they've had out of the Hornets, Harriers and all the airplanes we've flown before.

We all take pride in that.

We're going to give you a lot more capabilities, but it is the fact that we are Marines, and Marines is written on the aircraft – that makes it very important to us up there.

Thinking about the electronic warfare (EW) suite and its ability to detect waveforms and come up with countermeasures.

How do you interface with that as a pilot, is it something you make decisions about, or is automatic?

Mo: *Without getting into the technical details it is very, very simple for us.*

The way the jet is set up, we make a move to execute electronic attack and the jet will take care of it.

On a personal level as pilots, coming from other platforms and stepping into the F-35, do you have an "*aha*" moment that you can share?

Guts: *My first "aha" moment was a seemingly simple thing.*

I was executing a familiarization flight near MCAS Yuma. I was coming back to the airfield and I basically just turned the jet and pointed its nose at Yuma.

Immediately the jet is providing me the information of all the traffic that is out there in the airspace.

When I talk to approach for the first time they are telling me about the traffic that is out there that I already know about and I see it.

I can tell who everybody is that he is talking about and the jet also saw traffic that ATC hadn't seen yet and I asked about it. ***And I thought, "holy cow," here I am coming back to the field from a simple familiarity mission and my jet is telling me everything about the operational environment I am about to go into.***

In this case, something very simple, the traffic pattern coming back there, but I didn't have to do anything to have that level of SA.

I can start making decisions about what altitude I wanted to go to, if I wanted to turn left or right, speed up or slow down.

There's somebody coming up next to me, I want to get in front of them – or whatever.

It is a very simple example, but I thought WOW this is amazing that I see everything and can do that.

The other was the first time I vertically recovered the airplane. The flight control law that the airplane has is unbelievable and I always tell the anecdote. Flying AV-8B Harrier IIs, I only had one specific aircraft I felt like I could kind of go easy on the controls and it would sit there and hover.

I love the Harrier, love flying that aircraft, but there was work involved to bring it back for a vertical landing. The very first time I hovered an F-35B I thought, I am the problem here, and I am just going to let the jet do what it wants to do.

The F-35 was hovering better than I could ever hover a Harrier without doing a thing. That's back to that workload comment I said earlier. I am performing a vertical landing, and I have the time to look around and see what is taking place on the pad and around me. It is a testament to the jet.

FIGURE 4 PILOT BRIEFING ONBOARD THE USS AMERICA. CREDIT: TODD MILLER

Second Line of Defense

BC: *I was conducting a strike mission and Red Air was coming at me. In a 4th Gen fighter you must do a whole lot of interpretation. You see things in azimuth, and you see things in elevation. In the F-35 you just see the Gods eye view of the whole world. It's very much like you are watching the briefing in real time.*

I am coming in to perform the simulated weapons release, and Red Air is coming the other direction.

I have enough situational awareness to assess whether Red Air is going to be a factor to me by the time I release the weapon. I can make the decision, I'm going to go to the target, I'm going to release this weapon.

At the same time I pre-target the threat, and as soon as I release the A2G weapon, I can flip a switch with my thumb and shoot the Red Air.

This is difficult to do in a 4th Gen fighter, because there is so much manipulation of systems in the cockpit.

All while paying attention to the basic mechanics of flying the airplane and interpreting threat warnings that are often very vague, or only directional.

In the F-35 I know where the threats are, what they are and I can thread the needle. I can tell that the adversary is out in front of me and I can make a very, very smart decision about whether to continue or get out of there. All that, and I can very easily switch between mission sets.

Mo: *I was leading a four ship of F-35s on a strike against 4th Gen adversaries, F-16s and F/A-18s.*

We fought our way in, we mapped the target, found the target, dropped JDAMs on the target and turned around and fought our way out.

All the targets got hit, nobody got detected, and all the adversaries died. I thought, yes, this works, very, very, very well.

Never detected, nobody had any idea we were out there.

A second moment was just this past Thursday. I spent a fair amount of my life as a tail hook guy – [landing F/A-18s on US Navy Supercarriers] on long carrier deployments.

The last 18 seconds of a Carrier landing are intense. The last 18 seconds of making a vertical landing on this much smaller USMC Assault Carrier – is a lot more relaxed.

The F-35C is doing some great stuff. Making a vertical landing [my first this week] on the moving ship, that is much smaller than anything I've landed on at sea – with less stress, was pretty awesome.

Sack: *It was my first flight at Edwards AFB Jan '16. I got in the airplane and started it up. I was still on the deck and there were apparently other F-35s airborne – I believe USAF, I was not aware. I was a single ship, just supposed to go out and get familiar flying the aircraft.*

As the displays came alive there were track files and the SA as to what everyone else was doing in the airspace, and I was still on the ground. I mean, I hadn't even gotten my take-off clearance yet.

I didn't even know where it was coming from. It was coming from another F-35. The jet had started all the systems for me and the SA was there. That was a very eye opening moment for me.

The second one, took place when I came back from that flight. In a Hornet you would pull into the line and had a very methodical way in which you have to shut off the airplane and the systems otherwise you could damage something.

So you have to follow a sequence, it is very methodical about which electronic system you shut off. In the F-35 you come back, you do a couple things then you just shut the engine off, and it does everything else for you. Sounds simple, even silly – but it is a quantum shift.

The voice of the pilots is clear.

The F-35 is a platform with the ultimate level of sophistication, made simple.

THE WAY AHEAD FOR USMC CON-OPS: THE PERSPECTIVE OF COL. WELLONS, CO OF MAWTS-1

By Robbin Laird and Ed Timperlake

12/17/16

During our most recent visit to USMC Air Station Yuma, we had a chance to meet with the head of MAWTS-1 and discuss the way ahead for USMC concepts of operations as seen from this key tactical innovation center.

In our book on Pacific strategy, we highlighted the key role which the Marines are playing in shaping a new concepts of operations for US forces working with the joint and coalition forces in the region.

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.

Laird, Robbin; Timperlake, Edward; Weitz, Richard (2013-10-28). Rebuilding American Military Power in the Pacific: A 21st-Century Strategy: A 21st-Century Strategy (Praeger Security International) (pp. 258-259). ABC-CLIO. Kindle Edition.

Question: When we were last here, MAWTS-1 did not yet have its own F-35s.

Now you do.

How are working its integration with the MAGTF?

Col. Wellons: The great thing about MAWTS-1 is we run the Weapons Training Instructor course at Yuma twice a year, and as a former CO of MAWTS put it to me, WTI is where the USMC comes together every year to train for war.

We are able to do the MAWTS high-end training in terms of aviation support to the MAGTF.

Second Line of Defense

The F-35 is integrated into every mission that we do, whether it is close air support, helicopter escort, or, at the high end, air interdiction operations against a high-end threat including integrated air defense as well.

When we come back from a typical WTI mission exercise, and we debrief it with the helo and fixed wing guys and the C2 guys and the ground combat guys, more often than not it is the F-35 which is identified as the critical enabler to mission success.

It is the situational awareness we gain from that platform, certainly when dealing with a higher end threat like dealing with air defense, that provides us with capabilities we have in no other platform.

I am pleased with where we are with the airplane right now.

We have declared IOC and we are getting to deploy it to Japan.

FIGURE 5 THE MAWTS-1 LOGO AS SEEN ON THE MAWTS-1 BUILDING AT YUMA MCAS. CREDIT: SECOND LINE OF DEFENSE

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

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

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

Now we do not need to do so.

It changes the entire concept of close air support.

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

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

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

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

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

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

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

And that is now and not some future iteration.

Question: You are innovating as well with the F-35 as you integrate with your forces.

Can you describe an example of such innovation?

Col. Wellons: Absolutely.

One example has been something we did in the last WTI class, namely hot loading of the F-35 as we have done with the F-18 and the Harriers in the past.

We worked with NAVAIR and with China Lake and Pax River and came up with a set of procedures that we can use to do the hot load of an F-35.

We did it successfully at this last WTI class, and it shortens significantly the turn time between sorties.

When you think about us operating in some places around the world we do, the number of additional sorties we can generate as a result of being able to do that, and the reduction in the vulnerability that we have in terms of the turn around is crucial.

Also whenever you shut an airplane down, whether it's a fifth-gen airplane or a legacy airplane, it has a greater tendency to break.

We did GBU-12 last class, we'll be doing GBU-32 and AIM-120 this upcoming class.

Question: Obviously, you are working with the USAF and the US Navy on reshaping air operations affecting the MAGTF, can you give us a sense of that dynamic?

Col. Wellons: For the USAF, the capabilities of the airplane in terms of the sensors that we have, the weapons that we have, the way that we're employing this airplane, they're remarkably similar.

We are in lockstep with Nellis, with the weapons school, with the 53rd Tests and Evaluation Group in terms of how we're doing operational tasks, and we are very closely aligned with them in terms of how we employ the airplane, how we support the airplane.

We do quite a bit of work with Fallon. They are on a different timeline from the Air Force. They're a couple of years behind in terms of where they are, but I anticipate that we'll have similar collaboration with the Navy as they begin to lean forward into the F35 in the next couple of years.

Biography of Col. James Wellons

Second Line of Defense

Colonel James B. Wellons grew up in Victoria, Virginia. He graduated from the United States Naval Academy in May of 1992, earning his commission as a Second Lieutenant in the United States Marine Corps. After completion of The Basic School and Naval Flight Training, he reported to VMAT-203, Cherry Point, NC for AV-8B Harrier training.

Colonel Wellons completed AV-8B Harrier training in 1997 and reported to the VMA-231 "Ace of Spades," where he served in various assignments and deployed twice with the 26th Marine Expeditionary Unit, first in 1998 and again in 1999.

In March of 2000, Colonel Wellons returned to VMAT-203 for duties as an AV-8B instructor pilot and graduated from the MAWTS-1 Weapons and Tactics Instructor (WTI) Course.

In January of 2002, Colonel Wellons returned to VMA-231 as WTI and was promoted to Major. He then deployed as Future Operations Department Head for HMM-263 with the 24th Marine Expeditionary Unit from August of 2002 through May of 2003, during Operation IRAQI FREEDOM I.

In July of 2003, Colonel Wellons reported to MAWTS-1 in Yuma, Arizona for duties as an AV-8B instructor pilot. While at MAWTS-1, Colonel Wellons served as AV-8B Division Head and TACAIR Department Head; he also flew as an adversary pilot in the F-5E with VMFT-401.

FIGURE 6 COL. WELLONS. CREDIT: USMC

In June of 2006, Colonel Wellons reported to the School of Advanced Air and Space Studies (SAASS) at Maxwell Air Force Base, AL, graduating in June of 2007 with an M.A. in Airpower Art and Sciences. Upon graduation, Colonel Wellons reported to Marine Corps Forces Central Command (MARCENT) for duties as an operational planner. While at MARCENT he was promoted to Lieutenant Colonel.

In August of 2009, Colonel Wellons reported to Eglin Air Force Base, FL, where he stood up and commanded VMFAT-501, the F-35B Fleet Replacement Squadron. In February of 2012, Colonel Wellons relinquished command and reported to the U.S. Naval War College, in Newport, RI, where he graduated with highest distinction in March of 2013 with an M.A. in National Security and Strategic Studies.

In March of 2013, Colonel Wellons reported to U.S. Southern Command in Doral, FL for assignment as Executive Officer to the Commander. He was promoted to Colonel during this tour.

In June of 2015, Colonel Wellons reported to Marine Aviation Weapons and Tactics Squadron One, where he assumed command in May of 2016.

Colonel Wellons has held qualifications in the AV-8B, F-5E/F, and F-16C/D. His decorations include the Defense Superior Service Medal, Meritorious Service Medal with gold star in lieu of third award, Air Medal, Navy and Marine Corps Commendation Medal, and various unit and campaign awards.

http://www.29palms.marines.mil/Leaders/Leaders-View/Article/792387/col-james-b-wellons/

SHAPING A 21ST CENTURY ASSAULT FORCE FROM THE SEA: THE PERSPECTIVE FROM VMX-1

By Robbin Laird and Ed Timperlake

12/29/16

Col. Rowell is the first Commanding Officer of VMX-1: Marine Corps Operational Test and Evaluation Squadron 1.

VMX-1 includes the operational test & evaluation (OT&E) and science & technology (S&T) activities that have supported Marine Aviation from HMX-1, VX-9, MACCS-X and MAWTS-1.

One of its predecessors was VMX-22, which was established in 2003 for the express purpose of introducing the Osprey and shaped its evolving con-ops.

More than a decade later the Marines of VMX-1 are now helping to integrate the F-35B into Marine Air Ground Task Force (MAGTF) and are preparing for the next new Marine Aviation asset, the CH-53K.

The first CO of VMX-22 was then Colonel Walters.

General Walters is the current Assistant Commandant of the Marine Corps.

In an earlier interview Col. Walters indicated how the Osprey had changed operations.

They had their normal fair share of general support, resupplies, etc. But we started accelerating their use as my time there went on, and used them for both the conventional and Special Forces operations.

The beauty of the speed of the Osprey is that you can get the Special Operations forces where they need to be and to augment what the conventional forces were doing and thereby take pressure off of the conventional forces. And with the SAME assets, you could make multiple trips or make multiple hits, which allowed us to shape what the Taliban was trying to do.

The Taliban has a very rudimentary but effective early warning system for counter-air. They spaced guys around their area of interest, their headquarters, etc. Then they would call in on cell or satellite phones to chat or track. It was very easy for them to track. They had names for our aircraft, like the CH-53s, which they called "Fat Cows."

But they did not talk much about the Osprey because they were so quick and lethal.

And because of its speed and range, you did not have to come on the axis they would expect. You could go around, or behind them and then zip in. We also started expanding our night operations with the Osprey. We rigged up a V-22 for battlefield illumination.

Second Line of Defense

A lot of these mission sets were never designed into the V-22 but you put it into the field and configure it to do the various missions required. And we have new software for the Ospreys in Afghanistan where you can pick your approach, angle, approach speed and let the aircraft do it all. That is a huge safety gain.

http://www.sldinfo.com/2nd-maw-forward-the-role-of-airpower-in-the-afghan-operation/

We started the interview with Col. Rowell by recalling the original VMX-22 in this manner.

"When we were setting up the office, a Marine came in and said we had some old gear we needed to dispose of, including an older flight helmet.

I turned the helmet around and the name on it was Walters.

It now occupies the top shelf in my office."

About 2009, the OT&E missions of HMX-1 were ported over to VMX-22 to work through innovations with the CH-53E. The same had been done with the attack and light lift/utility helicopters years earlier with VX-9.

All of those missions, along with the F-35B and CH-53K efforts, have taken root in VMX-1 as well.

The unit is one which now has its foot firmly planted into the future while simultaneously shaping today's fight.

VMX-1's F-35Bs are at Edwards AFB as part of the Joint Operational Test Team which is working with their developmental test counterparts to evaluate and integrate the ongoing upgrades of the aircraft.

The VMX-1 F-35Bs will come to Yuma in 2018 and will be the center of excellence for global F-35Bs as well after the Block 3F software is complete.

VMX-1 will continue to shape the demand side for the F-35B community with regard to upgrades as well.

We asked about how integrated the British have been with Rowell and his Marines.

He noted that there is very close integration.

"It is crucial.

We carrier qualified a Royal Navy pilot onboard the USS America in USMC airplanes.

We are exchangeable.

There is no light between the Brits and the Marines.

FIGURE 7 VMX-1 LOGO

On the America, you had UK maintainers, and you had observers from HMS Queen Elizabeth on board the USS America as well."

"It is very important for the community to remain focused on commonality.

There is widespread recognition of this requirement.

The Marines are a key stakeholder in this process with the services and the allies.

We are well tied into the community to shape commonality for upgrades and shaping the way ahead."

This applies in strategic terms to shape integrated airpower from the UK to Norway to Denmark to the Netherlands and operating off of US and UK seabases.

"The interoperability between the USMC and the UK is a key thread in that effort with our ability to operate off of each other's ships.

It is like flying with someone else nationally but part of your own squadron."

How did the maintainability go aboard the USS America during your recent tests?

"We took an aircraft and pulled the engine, drive shaft and lift fan – then reinstalled and flew it off of the ship in sea state three.

We validated many of the toughest maintenance tasks at sea with that maintenance evolution, and that jet was one of the first planes off of the boat during the Lightning Carrier demonstration.

The two Yuma squadrons plus VMX-1 were working the maintenance and almost all of the maintainers had never been to sea as well.

Availability and maintainability was good.

We did not lose any flying time due to maintainability.

Very unusual for an aircraft at this stage of the game."

The test community is shifting its focus on airframe testing to the software upgradeability dynamic.

"We are internalizing that.

The biggest item I saw was the growing realization of what a software defined and upgradeable plane is all about. Many of your hardware dynamics are also about software.

For example, with regard to the fuel pump, what it does and how it performs is software driven.

You have to tweak the software a bit and you can get the fuel pump do what you want to do with it."

We then discussed the coming of the CH-53K to the USMC and the role of VMX-1 in that process.

"Not only is the lift much greater and the maintainability significantly better, but the aircraft will play into the enhanced situational awareness (SA) with the F-35, along with the speed and range of the MV-22 as an assault asset.

The pilot flying the F-35 will shape much greater SA to the MV-22 and the CH-53K as they inform and support the overall assault force.

Second Line of Defense

In effect, this is the flying infrastructure for the future MAGTF.

We will continue to refine the tactics, techniques and procedures (TPPs) as the force matures as well."

Col. Rowell Biography

Colonel Rowell received his commission upon graduation with Honors from the United States Naval Academy in 1992. Upon completion of the Basic School, he was assigned to flight training at Naval Air Station Pensacola, Florida.

After flight training in the T-34, T-2, and TA-4J he was designated a Naval Aviator in August 1995 and reported to VMFAT-101 in MCAS El Toro, California for conversion training in the F/A-18 Hornet.

Captain Rowell reported to MAG-11 at Marine Corps Air Station Miramar, California, in 1996 for duty with VMFA(AW)-225, where he served as the Schedules Officer, Airframes Officer, Assistant Maintenance Officer and Pilot Training Officer. He made two deployments to the Western Pacific in 1997 and 1999 in support of the Unit Deployment Program. While serving with the "Vikings", he graduated from the Weapons and Tactics Instructor course at MAWTS-1, and the TOPGUN course at the Navy Fighter Weapons School.

FIGURE 8 COL. ROWELL, CO OF VMX-1. CREDIT: USMC

Captain Rowell then transferred to MCAS Yuma, Arizona in 2000 for duty as an instructor pilot at Marine Aviation Weapons and Tactics Squadron One. During this tour he served as the Air-to-Air Employment SME, GPS Guided Weapons SME, Joint Strike Fighter SME and single-seat Forward Air Controller (Airborne) project officer. In 2002, Captain Rowell was promoted to Major. In 2003, Major Rowell deployed from MAWTS-1 to Al Jaber Air Base, Kuwait to augment VMFA(AW)-533 during Operation Iraqi Freedom. During his time in Yuma, Major Rowell was also NATOPS qualified in the F-5E/F and augmented the Snipers of VMFT-401.

In 2004, Major Rowell reported to Marine Corps Base Quantico, Virginia where he earned a Master's degree in Military Studies and was a distinguished graduate of the U.S. Marine Corps Command and Staff College.

In 2005, Major Rowell reported to MAG-31 at MCAS Beaufort, South Carolina where he served as the MAG FA-18 tactics training officer for a year prior to reporting to VMFA-122 as the Aircraft Maintenance Officer. The "Crusaders" deployed to the Western Pacific in 2006 in support of the Unit Deployment Program. Upon return, Major Rowell reported back to MAG-31 to serve as the Group Operations Officer.

After serving at MAG-31 Headquarters for a year, Lieutenant Colonel Rowell reported back to VMFA-122, the "Werewolves" in 2008 as the Executive Officer. In September 2008, he deployed to Al Asad Air Base,

Iraq in support of Operation Iraqi Freedom. In January 2009, he detached from VMFA-122 and reported to 2d Marine Aircraft Wing (Forward) for duties as Battle Captain in the Tactical Air Command Center. During his time in the TACC, Lieutenant Colonel Rowell continued to augment VMFA-122 and VMFA-314. He returned from Iraq in July 2009 and again assumed duties as the MAG-31 Operations Officer.

In June 2010, LtCol Rowell assumed command of VMFA(AW)-533. Under his command, the Hawks completed a training deployment to El Centro, CA and a deployment to the Western Pacific in support of the Unit Deployment Program. The Hawks were the first FA-18 squadron to obtain the highest level of combat readiness while on deployment, and were the recipients of the Robert M. Hanson Trophy as the 2011 Marine Fighter Squadron of the Year.

Lt. Col. Rowell relinquished command of The Hawks in November, 2011 and served as MAG-31 Executive Officer until June, 2012 when he reported to U.S. Army War College. He graduated from the U.S. Army War College in June, 2013 and reported to the Pentagon for duty on the Joint Staff. He served two years in the Capabilities and Acquisition Division of the J-8 as the Strategic and Tactical Systems branch chief with responsibilities for air munitions, manned aerial systems and nuclear weapons.

Colonel Rowell has converted to the F-35B and MV-22B in anticipation of commanding Marine Operational Test and Evaluation Squadron 1.

Col Rowell has over 3400 flight hours in the F/A-18, F-5, F-35B and MV-22 with 2900 hours in the F/A-18, and has held every tactical and flight designation qualification in that aircraft. His personal awards include the Defense Meritorious Service Medal, Meritorious Service Medal with gold star, Air Medal Individual Action with combat distinguishing device, Air Medal Strike/Flight Award with numeral five, Navy/Marine Corps Commendation Medal with two gold stars and combat distinguishing device, and the Navy Achievement Medal.

http://www.aviation.marines.mil/Leaders/Article/782606/colonelbrgeorge-b-rowell-iv/

WORKING THE MV-22 WITH F-35 INTEGRATION: SHAPING FUTURE TRAP MISSIONS IN A DANGEROUS WORLD

By Ed Timperlake and Robbin Laird

12/30/16

In addition to the interview which we had with the CO of MAWTS-1, Col. Rowell, we had a chance to talk with Lt. Col. Nelson, the XO of MAWTS-1 and Major Duke.

Lt. Col. "Cowboy" Nelson was on the deployment under the command of Lt. Col. Bianco when we conducted an interview with the first squadron of MV-22s, which deployed to Afghanistan in early 2010.

In that interview conducted by telephone when the squadron was in Afghanistan, Lt. Col. Bianco highlighted a number of key contributions of the aircraft to the fight.

The most compelling point underscored by the squadron commander is how, in effect, the Osprey has inverted infrastructure and platform.

Normally, the infrastructure shapes what the platform can do. Indeed, a rotorcraft or a fixed wing aircraft can operate under specific circumstances.

Second Line of Defense

With the range and speed of the Osprey aircraft, the plane shapes an overarching infrastructure allowing the ground forces to range over all of Afghanistan, or to be supported where there are no airfields, or where distributed forces need support.

The envelopment role of the Osprey is evident in Afghanistan as well, whereby the Osprey can provide the other end of the operational blow for the ground or rotorcrafts in hot pursuit of Taliban.

The Osprey can move seamlessly in front of rotorcraft and land forces, allowing the pursuit of different lines of attack. The envelopment role was not the focus of the interview because of security considerations, but anecdotal evidence suggests such an emerging role.

http://www.sldinfo.com/the-osprey-in-afghanistan-a-situation-report/

The progress of the Osprey since then in terms of its performance and impact on the evolution of USMC concepts of operations has been significant.

FIGURE 9 ED TIMPERLAKE WITH LT. COL. NELSON AND MAJOR DUKE OUTSIDE OF THE MAWTS-1 BUILDING AFTER THE INVERVIEW WITH SECOND LINE OF DEFENSE. CREDIT: SLD

The F-35B coming into the force is having a similar impact but is building upon the prior experience, which the Marines have had with the Osprey.

Given "Cowboys" long experience with the Osprey and its maturation, he brings the experience of Marines shaping a way ahead with revolutionary technologies associated with the Osprey to the new task, namely, the integration of the F-35 into the USMC.

"Part of the mission at MAWTS-1 is to familiarize the students with the new options associated with the F-35 and that requires a mind shift for Marines in working through how to best leverage the aircraft."

The digital interoperability initiative being conducted by the USMC is a key part of shaping the situational awareness thread for the insertion of the assault force via the Osprey and the F-35.

The F-35 as a key generator of SA to be distributed to the incoming assault force.

"The new generation is so technologically sophisticated that they will thrive in the evolving digital environment of which the F-35 is a key element."

A key impact of integrating the MV-22 with the F-35 will clearly be with regard to the Tactical Recovery of Aircraft and Personnel or TRAP mission.

The Osprey has already demonstrated a sea change on how TRAP is done.

This has already been demonstrated in combat in the Odyssey Dawn operation.

With the USS Kearsarge off of (ironically enough) the shores of Tripoli, the Air Combat Element or ACE began to deliver unique resupply capabilities to the Kearsarge, which allowed the Harriers to triple their sortie generation rates.

By being able to fly directly to Sigonella rapidly and back the Ospreys kept the Harriers in the air much longer than anticipated.

And the TRAP mission over Libya saw the Marines execute the mission at least 45 minutes faster than the next available platform and did so very rapidly after having received the go order.

We interviewed Marines involved in the Trap mission and it was clear that to these Marines there was growing awareness of what the Osprey could provide to the MAGTF.

*As Maj. B.J. Debardeleb*e, *one of the Osprey aviators involved with the TRAP mission highlighted:*

We made the judgment that we had to accelerate the mission.

We moved towards our top speed as the pilot was moving to a new location on the ground.

The pilot on the ground indicated that "they're still going at us, and things are getting worse."

And he is clearly on the move.

We had the grid of the plane crash site and we got a new grid and realized that it was much further away from where the original crash site was. So he'd been on the move the whole time. If I had been flying a SEA KNIGHT, by the time I had gotten the new information with regard to the shift in the grid, and flown for the 40 minutes under those conditions, I would have been relatively exhausted by the time I got there because you're holding the controls, and you're getting shaken the whole time.

On the Osprey, I am on autopilot.

So I can take a sip of water, I'm assessing everything, and I'm listening to what's going on very clearly.

The V22s very quiet in airplane mode so we can hear the radios very well, but if I was in a SEA KNIGHT the noise would make it difficult to hear.

The grunts in the back were able to look at a moving map that they can look at to have both SAs when we're getting closer and closer to coast line

And so in that flight task now they're relaxed and comfortable instead of them shaking in the back because usually with all the shaking makes you groggy you sleep, so you have to wake them up when you land.

So they're in the back at least relaxed and calm before we drop them off.

http://www.sldinfo.com/looking-back-on-the-libyan-trap-mission-battle-hardened-marines-drive-innovation/

http://www.sldinfo.com/the-execution-of-the-trap-mission-over-libya/

This capability is a significant strategic capability and one, which is crucial in the fight against ISIS, a terrorist group more than willing to torture and kill pilots.

Now with the F-35 replacing the Harrier and flying with the Osprey, the range of operational conditions into which the TRAP mission can now be flown is expanding significantly.

Second Line of Defense

Even into contested areas the F-35 can work with the Osprey to save lives and to extract pilots from harm's way.

This micro capability is reflective of what the USMC-USN team can do from the sea with an F-35 enabled force and be able to deliver the ground combat element via the Osprey backed by the F-35 as a significantly expanded close air support aircraft.

The dynamics of integration with the F-35 with the Osprey and changing concepts of operations provides political leaders with new strategic options for inserting and withdrawing force against a threat.

We also discussed a key shift as the number of F-35s goes up, the role of the user groups will be enhanced in shaping the future evolution of the aircraft.

Major Duke noted that already at WTI courses NAVAIR engineers are coming to the courses and observing how the aircraft is being used by Marines in those courses.

"They sent two engineers last Spring.

This has happened in the past, so it is back to the future in effect as we shape the way ahead for the F-35."

In short, the role of MAWTS-1 and its students will become key demand side driver for how the software defined and upgradeable aircraft, which is the F-35, evolves. If you do not get the point about software upgradeability you will not understand what the F-35 is all about.

THE GREEN KNIGHTS ON THE WAY TO JAPAN: A DISCUSSION WITH LT. COL. BARDO, CO, VMFA-121

By Ed Timperlake and Robbin Laird

1/2/17

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

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

http://www.sldinfo.com/visiting-the-f-35-squadron-at-yuma-air-station-the-executive-officer-of-vmf121-provides-an-update/

http://www.sldinfo.com/visiting-mcas-beaufort-air-station-f-35b-and-renorming-airpower/

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

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

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

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

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

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

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

http://breakingdefense.com/2016/10/rear-adm-manazir-speaks-on-allied-force-transformation-a2ad/

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

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

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

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

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

FIGURE 10 THE SQUADRON AT RED BEACH. CREDIT:USMC

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

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

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

Second Line of Defense

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

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

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

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

As Lt. Col Bardo described the F-35:

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

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

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

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

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

http://www.sldinfo.com/vmfa-121-at-red-beach/

http://www.sldinfo.com/steel-knight-16-a-step-for-vmfa-121-on-the-way-to-japan-in-2017/

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

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

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

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

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

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

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

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

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

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

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

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

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

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

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

Lt. Col. Bardo commented:

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

Although much has changed; much has not.

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

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

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

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

Biography of Lt. Col. Bardo

Lieutenant Colonel Bardo is a graduate of Whittier College and holds a B.A. in Biology. He was commissioned a Second Lieutenant in May of 1998 and attended The Basic School that fall. Upon completion, he began Aviation Preflight training at NAS Pensacola, FL. He conducted his primary flight training in the T-34C while assigned to VT-28 at NAS Corpus Christi, TX. Following primary flight training, he was reassigned to VT-22 at NAS Kingsville, TX. He earned his Naval Aviator's Wings in September of 2001.

He completed fleet replacement training in the AV-8B Harrier at Marine Attack Training Squadron 203 at MCAS Cherry Point, NC.

In September of 2002, First Lieutenant Bardo reported to MCAS Yuma and was assigned to Marine Attack Squadron 214.

Second Line of Defense

While assigned to the "Black Sheep" he served as the Powerline Division Officer and a daily schedule writer. Promoted to Captain in October of 2002, he deployed in support of Operations Southern Watch (OSW) and Iraqi Freedom (OIF) I. In spring of 2004, Captain Bardo deployed aboard the USS Belleau Wood as part of the 11th Marine Expeditionary Unit (MEU). Upon reaching the Persian Gulf, the 11th MEU transitioned ashore in support of OIF II. Upon returning home from deployment, Captain Bardo transferred to 3D MAW headquarters in Miramar where he augmented the G-3 Staff while maintaining currency in the AV-8B.

In June of 2006, Captain Bardo returned to the "Black Sheep" and completed the flight leadership and instructor prerequisites to attend the Weapons and Tactics Instructor Course. Upon completion of WTI class 1-07 in October, Captain Bardo served as the Pilot Training Officer. In January 2007, he deployed to Japan for one year supporting two back-to-back 31st MEUs.

In October of 2008, he was promoted to Major and began serving as the Aircraft Maintenance Officer. He deployed in May 2009 to Kandahar Air Base, Afghanistan in support of Marine Aircraft Group 40, 2d Marine Expeditionary Brigade flying in support of Operation Enduring Freedom (OEF).

In December of 2009, Major Bardo reported to Eglin Air Force Base, FL as one of the initial cadre of instructors tasked with standing up the "Warlords" of Marine Fighter Attack Training Squadron 501, the USMC's first F-35B squadron. In January of 2011, Major Bardo was selected to attend Intermediate Level School at the Naval War College in Newport, Rhode Island where he earned a Master of Arts in National Security and Strategic Studies. He returned to VMFAT-501 where he completed transition training to the F-35B. While at VMFAT-501, he served as the Director of Safety and Standardization as well as the Operations Officer.

FIGURE 11 LT. COL BARDO TALKING WITH JAPANESE VISITORS TO YUMA MCAS. CREDIT: USMC

In January of 2015, Lieutenant Colonel Bardo reported to MAG-13, located at MCAS Yuma, Arizona and assumed command of VMFA-121 in July of 2015.

Lieutenant Colonel Bardo has over 1800 flight hours, primarily in the AV-8B and F-35B and over 480 combat hours in support of OSW, OIF, and OEF. His qualifications include: Weapons and Tactics Instructor, Mission

Commander, Training Landing Signal Officer, Air Combat Tactics Instructor, Low Altitude Tactics Instructor, Functional Check Flight pilot and Demonstration pilot.

His personal decorations include the Meritorious Service Medal, Air Medal with Strike Numeral "12", Navy and Marine Corps Commendation Medal, third award, and Navy and Marine Corps Achievement Medal, fourth award.

http://www.3rdmaw.marines.mil/Leaders/LeadersView/Article/614148/lieutenant-colonel-bardo/

The first slideshow shows the squadron on the day we visited and are credited to Second Line of Defense.

The second slideshow shows the squadron participating in Steel Knight and operating at Red Beach.

The third slideshow shows them at Red Flag in an all-US air combat exercise.

The fourth slideshow shows a Japanese visit to the squadron in Yuma earlier this year with Lt. Col. Bardo working with the Japanese visitors.

The photos for the final three slideshows are all credited to the USMC.

Editor's Note: When you visit the squadron, in the main building there is a Joseph Foss room.

Looking at the history of the squadron and Joe Foss's role in that history, one can understand the heritage being built into the new combat capability represented by the F-35 B for the 21st Century USMC.

Tradition clearly matters.

Joseph Foss, C.O. VMF-121, Medal of Honor Recipient

By Stephen Sherman, July, 1999. Updated June 30, 2011.

Joe Foss was born on April 17, 1915 to a Norwegian-Scots family in South Dakota. He learned hunting and marksmanship at a young age. Like millions of others, 11-year old Joe Foss was inspired by Charles Lindbergh, especially after he saw Lindy at an airport near Sioux Falls.

Five years later he watched a Marine squadron put on a dazzling exhibition, led by Capt. Clayton Jerome, future wartime Director of Marine Corps Aviation.

In 1934, Joe began his college education in Sioux Falls, but he had to drop out to help his mother run the family farm. However he scraped up $65 for private flying lessons. Five years later he entered the University of South Dakota again and supported himself by waiting on tables. In his senior year he also completed a civilian pilot training program before he graduated with a Business degree in 1940.

Upon graduation he enlisted in the U.S. Marine Corps reserves as an aviation cadet. Seven months later, he earned his Marine wings at Pensacola and was commissioned a second lieutenant. For the next nine months he was a 'plowback' flight instructor. He was at Pensacola when the news of Pearl Harbor broke, and since he was Officer of the Day, he was placed in charge of base security. Thus he prepared to defend Pensacola from Jap invaders, riding around the perimeter on a bicycle.

Second Line of Defense

FIGURE 12 JOE FOSS. WIKIPEDIA

To his distress, he was then ordered to the aerial photographers school and assigned to a VMO-1, a photo reconnaissance squadron.

But he insisted he wanted fighter pilot duty, even after being told "You're too ancient, Joe. You're 27 years old!" After lengthy lobbying with Aircraft Carrier Training Group, he learned all about the new F4F Wildcat, logging over 150 flight hours in June and July.

When he finished training, he became executive officer of VMF-121.

Three weeks later, he was on his way to the South Pacific, where the United States was desperately trying to turn the tide of war. Arriving in the South Pacific, VMF-121 was loaded aboard the escort carrier Copahee.

Guadalcanal

On the morning of October 9, they were catapulted off the decks, in Joe's only combat carrier mission. Landing at Henderson Field, he was told that his fighters were now based at the 'cow pasture.'

He was impressed with the 'make-do' character of the 'Cactus Air Force. The airfield was riddled with bomb craters and wrecked aircraft, but also featured three batteries of 90mm anti-aircraft guns and two radar stations. As 'exec' of -121, he would normally lead a flight of two four-plane divisions, whenever there were enough Wildcats to go around.

He was the oldest pilot in the flight, four years older than the average age of 23. The flight would become known as 'Foss's Flying Circus' and rack up over 60 victories. Five of them would become aces; two would die in the in the fight for Guadalcanal.

On October 13, 1942, VMF-121 scored its first victories when Lts. Freeman and Narr each got a Japanese plane. Later that same day, Joe led a dozen Wildcats to intercept 32 enemy bombers and fighters. In his first combat, a Zero bounced Joe, but overshot, and Joe was able to fire a good burst and claim one destroyed aircraft.

Instantly, three more Zeros set upon him, and he barely made it back to 'Fighter One', his Wildcat dripping oil. Chastened by the experience, he declared "You can call me 'Swivel-Neck Joe' from now on." From the first day, Joe followed the tactics of Joe Bauer: getting in close, so close that another pilot joked that the

'exec' left powder burns on his targets. The next day while intercepting a flight of enemy bombers, Joe's engine acted up and he took cover in the clouds. But suddenly a Wildcat whizzed past him, tailed by a Zero. Joe cut loose and shot the Zero's wing off. It was his second victory in two days.

While the Wildcats' primary responsibility was air defense, they also strafed Japanese infantry and ships when they had enough ammunition. Joe led on such mission on the 16th. Mid-October was the low point for the Americans in the struggle for Guadalcanal.

Japanese warships shelled the U.S. positions nightly, with special attention to the airstrips. To avoid the shelling, some fliers slept in the front lines. Foss grew to appreciate the Navy's fighter doctrine and found that the "Thach Weave" effectively countered the Zero's superior performance, because "it allowed us to point eyes and guns in every direction."

Joe was leading an interception on morning of the 18th when the Zero top cover pounced on them and downed an F4F. But Foss was able to get above them and flamed the nearest, hit another, and briefly engaged a third. Gaining an angle, he finally shot up the third plane's engine.

Next he found a group of Bettys already under attack by VF-71. He executed a firing pass from above, flashed through the enemy bombers, and pulled up sharply, blasting one from below. Nine days at Guadalcanal and he was an ace! Two days later Lt. Col. Harold Bauer and Foss led a flight of Wildcats on the morning intercept. In the dogfighting, Joe downed two Zeros, but took a hit in his engine. He landed safely at Henderson Field with a bad cut on his head, but otherwise unharmed.

'Cactus Fighter Command' struggled to keep enough Wildcats airworthy to meet the daily Japanese air strikes. On the 23rd, it put up two flights, led by Foss and Maj. Davis. There were plenty of targets and Joe soon exploded a Zero. He went after another which tried to twist away in a looping maneuver. Joe followed and opened up while inverted at the top of his loop. He caught the Zero and flamed it. He later described it as a lucky shot.

Next he spotted a Japanese pilot doing a slow roll; he fired as the Zero's wings rolled through the vertical and saw the enemy pilot blown out of the cockpit, minus a parachute. Suddenly he was all alone and two Zeros hit him, but his rugged Grumman absorbed the damage, permitting Foss to flame one of his assailants.

Once again, he nursed a damaged fighter back to Guadalalcanal. So far he had destroyed eleven enemy planes, but had brought back four Wildcats that were too damaged to fly again.

October 25 was the day that the Japanese planned to occupy Henderson Field; they sent their fighters over, with orders to circle until the airstrip was theirs. It didn't work out that way, as the U.S. ground forces held their lines and 'Cactus' did its part. Joe Foss led six Wildcats up before 10 AM, and claimed two of the Marine's three kills on that sortie.

Afterwards, he berated himself for wasting ammunition on long-range shooting. He kept learning how important it was to get close. (The great German ace, Erich Hartmann, said "Get close enough until the airplane fills the whole windscreen; then you can't miss.") In an afternoon mission on the 25th, he downed three more, to become the Marine Corps' first 'ace in a day'. He had achieved 14 victories in only 13 days.

Despite rugged living conditions and the stress of daily combat flying, Foss retained his enthusiasm. He and some other fliers of VMF-121 occasionally went prowling with their rifles in the jungle, looking for Japanese soldiers, but Col. Bauer stopped this activity; trained fighter pilots were too valuable to risk this way.

Second Line of Defense

They slept in six-man tents and ate the wretched powdered eggs that are mentioned in almost every pilot's memoirs. On guy had a gramophone that they played scratchy records on. They bathed in the Lunga River; many grew beards rather than try to shave in cold water. They kept the beards neatly trimmed, not for appearances, but to ensure their beards didn't interfere with the close-fitting oxygen masks. 'Washing Machine Charlie' and 'Millimeter Mike' harassed the field nightly, so some pilots tried to sleep in the daytime.

Down!

On November 7th Foss led seven F4Fs up the Slot to attack some IJN destroyers and a cruiser, covered by six Rufe floatplane fighters. They dispatched five of the Rufes promptly and prepared to strafe the destroyers. Joe climbed up to protect the others and got involved in a dogfight with a Pete, a two-man float biplane. He shot down the slow-flying plane, but not before its rear gunner perforated the Wildcat's engine with 7.7mm machine gun fire.

Once again, Foss' aircraft started sputtering on the way home. But his time, it didn't make it. As the engine died, he put it into the longest possible shallow dive, to get as close to home as he could.

As his plane went into the water off Malaita Island, Foss struggled with his parachute harness and his seat. He went under with his plane, gulped salt water, and almost drowned before he freed himself and inflated his Mae West. Exhausted and with the tide against him, he knew that he couldn't swim to shore. While trying to rest and re-gain his strength in his life raft, he spotted shark fins nearby. He sprinkled the chlorine powder supplied for that purpose in his emergency pack and that seemed to help.

As darkness approached, he heard some searchers looking for him. They hauled him in and brought him to Malaita's Catholic mission. There were a number of Europeans and Australians, including two nuns who had been there for forty years and had never seen an automobile. They fed him steak and eggs and invited him stay for two weeks.

The next day a PBY Catalina, piloted by Maj. Jack Cram rescued him. On his return to Guadalcanal, he learned that 'Cactus' had downed 15 Japanese planes in the previous day's air battle. His own tally stood at 19. On the ninth, Admiral Bull Halsey pinned the Distinguished Flying Cross on him and two other pilots.

The Americans were bringing four transports full of infantry to Guadalcanal on November 12. The Japanese sent 16 Betty bombers and 30 covering Zeroes after them, while the American Wildcats and Airacobras defended.

Foss and his Wildcats were flying top cover CAP and dived headlong into the attackers, right down onto the deck. As Barrett Tillman described it in Wildcat Aces of WWII: Ignoring the peril, Foss hauled into within 100 yards of the nearest bomber and aimed at the starboard engine, which spouted flame. The G4M tried a water landing, caught a wingtip and tumbled into oblivion. Foss set his sight on another Betty when a Zero intervened. The F4F nosed up briefly and fired a beautifully aimed snapshot which sent the A6M spearing into the water. He then resumed the chase.

Foss caught up with the next Betty in line and made a deflection shot into its wingroot; the bomber flamed up and then set down in the water. The massive dogfight continued, until Joe ran out of fuel and ammunition.

Between the fighters and the AA, the Americans destroyed almost all the bombers and many of the Zeros. No U.S. ships were seriously damaged. But that night another naval surface battle raged in Ironbottom Sound. Warships on both sides were sunk or damaged, including the IJN battleship Hiei which Marine bombers and

torpedo planes finished off on the 13th. The major Japanese effort continued on the 14th, as they brought in a seven ship troop convoy. The American air forces cut this up as well.

Late that afternoon, Col. Bauer, tired of being stuck on the ground at Fighter Command, went up with Joe to take a look. It was his last flight, described by Joe Foss in a letter to Bauer's family. No trace of 'Indian Joe' was ever found. Back at Guadalcanal, Foss was diagnosed with malaria. Two great leaders of Cactus Fighter Command were gone, although Foss would return in six weeks.

He recuperated in New Caledonia and Australia. He met some of the high-scoring Australian aces, who viewed the Japanese as inferior opponents and were a little dismissive of Joe's 23 victories. After a brief relapse of malaria, Joe returned to Guadalcanal on New Year's Day. Improvements had been made in his absence, notably pierced steel planking (PSP) for the Fighter Strip. Foss returned to combat flying on the 15th when he shot down three more planes to bring his total to 26.

He flew his last mission ten days later when his flight and four P-38s intercepted a force of over 60 Zeros and Vals. Quickly analyzing the situation, he ordered his flight to stay high, circling in a Lufbery. This made his small flight look like a decoy to the Japanese. Soon Cactus scrambled more fighters and the Japanese planes fled. It was ironic that in one of Joe Foss' most satisfying missions, he didn't fire a shot.

http://acepilots.com/usmc_foss.html

THE USS AMERICA: REDEFINING AMPHIBIOUS ASSAULT

By Robbin Laird

10/08/14

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

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

To set the proper landscape to discuss the changes within aviation and the amphibious fleet, one can go back a decade ago and look at the aviation and ship pairings and their operational reach.

The ARG-MEU a decade ahead operated within the LPD-17, without the T-AKE ship, without the Osprey and was primarily a rotorcraft, landing vehicle and mixture of Harrier fast jets force. And the three ship ARG-MEU would operate largely in a 200-mile box affecting the objective area where it was located.

The Osprey has obviously been a game changer, where today, the ARG-MEU can "disaggregate" and operate over a three-ship distributed 1,000-mile operational area. Having the communications and ISR to operate over a greater area, and to have sustainment for a disaggregated fleet is a major challenge facing the future of the USN-USMC team.

A major change in the ship can be seen below the flight deck, and these changes are what allow the assault force enabled by new USMC aviation capabilities to operate at greater range and ops tempo.

The ship has three synergistic decks, which work together to support flight deck operations. Unlike a traditional large deck amphibious ship where maintenance has to be done topside, maintenance is done in a hangar deck below the flight deck.

Second Line of Defense

And below that deck is the intermediate area, where large workspaces exist to support operations with weapons, logistics and sustainment activities.

In an interview with the ship's Captain, Robert Hall, just prior to the departure in mid-July from the Ingalls Huntington shipyard in Pascagoula Mississippi, the CO highlighted some of the ship's capabilities:

The ship has several capabilities, which allow us to stay on station longer than a traditional LHA and to much better support the Ospreys and the F-35Bs which will be the hallmark of USMC aviation to enable long range amphibious assault. These aircraft are larger than their predecessors.

They need more space for maintenance and this ship provides it.

We have two high-hat areas to support the maintenance, one of them located behind the aft flight deck elevator to allow movement through the hangar.

We have significantly greater capacity to store spare parts, ordnance and fuel as well. We can carry more than twice as much JP-5 than a traditional LHA.

The ship has three synergistic decks, which allow for a significant enhancement of the logistical or sustainment punch of the amphibious strike force.

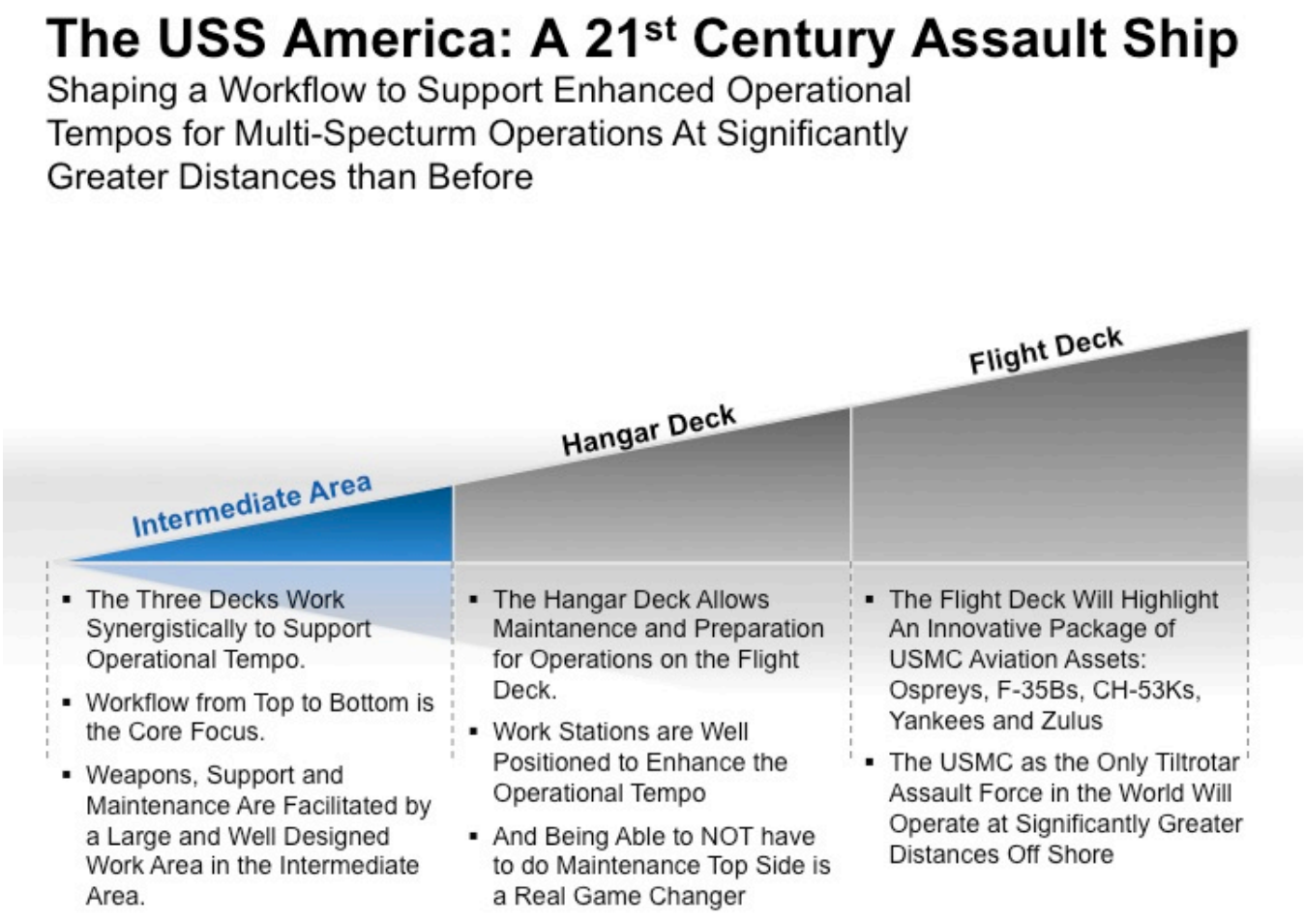

FIGURE 13 USS AMERICA AS 21ST CENTURY ASSAULT SHIP. GRAPHIC CREDITED TO SECOND LINE OF DEFENSE

According to Captain Hall:

I like the synergistic description.

The flight deck is about the size of a legacy LHA. But that is where the comparison ends. By removing the well deck, we have a hangar deck with significant capacity to both repair aircraft and to move them to the flight deck to enhance ops tempo.

With the Ospreys, we will be able to get the Marines into an objective area rapidly and at significant distances. And when the F-35B comes the support to the amphibious strike force is significantly enhanced.

And we will be able to operate at much greater range from the objective area.

With the concern about littoral defenses, this ship allows us the option to operate off shore to affect events in the littoral.

This is a major advantage for a 21st century USN-USMC team in meeting the challenges of 21st century littoral operations.

The USS America will provide a significant boost to the ability to both maintain and to provide operational tempo to support the force.

And in an additional interview with Major David Schreiner, the ship integration officer within Headquarters USMC Aviation, the Marine Corps officer highlighted how the ship will do this and how it fits into evolving thinking about the future of the amphibious task force.

According to Major Schreiner, one of the key elements of maintaining the Osprey is the need to open the nacelles and to work on them. On current LHAs, this can only be done topside, but with the new ship, it will be possible to maintain the Ospreys completely in the Hangar deck.

The traditional LHA was sized primarily for rotorcraft operations; the new one is sized for the Osprey and the F-35B.

According to Major Schreiner:

The footprint of the new aviation assets are about 30-40% larger than the rotorcraft and fast jets they are replacing. With the change in operational capabilities and concepts comes the need to provide for a new logistics capability for the force as well.

The logistics demands from the Ospreys on the traditional LHAs required work topside, which affects flight deck operations as well as facing daylight limitations within which the work needed to be done.

What we found with the MV-22 was that it needed some extra space. It needed some space in the hangar for assault maintenance. What we found in the legacy amphibious ships that we were unable to do that efficiently down below, so the workaround for the Marines, the only workaround is to do those modifications topside which are extremely time consuming and it is a delicate balance on doing them during a period of daylight where they could effectively see and then balance it out with flight operations.

To get the needed changes, the ship designers of the USS America look to the hangar deck and the intermediate areas. The hangar deck has no well deck and that provides extra space as well as overhead cranes and storage areas for parts.

The ops tempo for the assault force is enhanced as well.
Second Line of Defense

According to Major Schreiner:

"The idea was is not only to provide enough space to incorporate for the growth in airframes and the logistics footprints but also to provide for operational maneuver space down below as well. We can cycle planes from the hangar to the flight deck to enhance sortie generation rates for the helos, the Ospeys and the F-35Bs in whatever package is appropriate to the mission."

Working the synergy among the three decks will be crucial to shaping the workflow to support operational tempo.

"Your next aircraft for the flight deck can be positioned down below for a quick elevator run thereby enabling a larger volume of flights off the deck. You could then work into the deck cycle and elevator run to bring up those extra aircraft as a way not only to provide backups but to provide extra sorties for the flight deck."

Synergy and enhanced workflow are really the two outcomes which come from a ship designed for 21st century assault assets.

Instead of having to do all the maintenance topside you have the spaces down below from the heavy maintenance with the use of upright cranes and the work centers that are collocated right on the hangar bay with the supporting equipment work centers, the control work centers, and just below it on the intermediate deck below.

You have all your supply centers and then you have your intermediate level maintenance as well for that sensitive calibration, for the more complex repairs.

This creates a cycle or synergy where you have supervisors that the work centers are collocated with the maintenance that's being done on the hangar. You have maintenance actions being produced. They are brought in; they are logged into the system, they are evaluated, they can go downstairs and they can either be fixed on the spot, calibrated, the part could be reworked or the supply system being right there, a new part in the supply could be issued back up, turned. There will be very little waste of time between different parts of the ship all supervised, brought back up, and repaired on the plane.

Clearly, this workflow will be a work in progress as the crew and the Marines shape ways to work the decks to optimize what can come off of the flight deck.

Aircraft maintenance and operations at sea are extremely hard; extremely hard on the actual airframes and they are extremely hard on the maintainers that are doing the work because the reality of it is that in a 24 hour cycle, half the time is spent conducting flight operations topside where there is very little space to do maintenance.

It is just too congested.

It is too busy and so by default you have to wait till flight operations stop which limits you in your maintenance to periods usually in darkness where it is hard or reduce cycle say 12 hours to do the maintenance in order to turn those aircraft around.

By having access to hangar bay, you have a safe space, you have a well-lighted space; you have room to safely move and now you are able to do concurrent maintenance actions.

I'm not saying that you couldn't do that on a legacy class but you can just do this on a much greater scale and with greater efficiency on the AMERICA so you are able to make the timely inputs, the timely maintenance actions ultimately to keep the available assets up.

For operators and maintainers, the intermediate area below the hangar deck is a major change as well.

Marines will have access to world class or corner space standard test batches for calibration, they can do everything at sea can be done in a corner space or a land environment. From a warship capability is amazing and the goal is to increase the repairable capability on the ship rather than waiting for parts to be sent to the ship.

Transit time loss is a big deal; sometimes we have to go halfway around the world for a part because there is no way to beat the geographic distance.

The only way you can do that with a part is to have a spare in the supply system.

Now you have an aircraft that either has to have a cannibalization of a part to keep it flying or you have to wait and you have your downtime on an aircraft.

The goal of the I level is to be able to actually be able to repair aircraft with parts on board. And with the increased storage capacity this clearly will happen.

The USS America will make a significant contribution to the amphibious strike force, but no platform fights alone.

It will be a key element or even flag ship of evolving approaches. When one marries the new MSC assets –T-AKE and USNS Montford Point assets – to the LPD-17 and the USS America, the USN-USMC team will have a very flexible assault force, with significant vehicle space, berthing space for embarked Marines and shaping the future mix and match capabilities of the modular force.

To illustrate the impact of such a task force on berthing of embarked Marines, in addition to berthing on the USS America, one could carry 680 Marines aboard an LPD-17, 100 aboard a T-AKE ship and 250 aboard a Montford Point, and that is with current capabilities which be modified as modular capabilities evolve against operational needs, requirements and funding.

In short, the USS America is part of the evolving amphibious strike task force, and will work synergistically with other new or legacy assets in providing capabilities necessary for 21st century operations.

THE TRANSFORMATION OF JOINTNESS: THE NAVY AND MARINES REWORK OPERATIONS FROM THE SEA

By Robbin Laird

9/18/15

The Army has so hijacked the concept of jointness that the broader transformation of jointness being shaped by the evolution of the amphibious forces has escaped attention as precisely what it is – the transformation of joint capabilities.

In broad terms, amphibious operations has shifted from primarily providing a transport capability to providing a base of operations for the air-land-sea domains, and the flexibility of the evolving amphibious task force allows it to focus on the primary domain necessary for the mission: ground, air or sea.

It is a flexible Swiss army knife for joint operations. The V-22 Osprey has been a key agent of change whereby ground forces can be inserted at greater distance, resupply can be managed from land to the sea

Second Line of Defense

base, or force packages built around the Osprey can execute missions previously only possible with the "large deck" amphibious ships.

There is little question that there is a significant shortage of L-class ships and the enablers for what the evolving amphibious task force needs, but it is also clear that allies are looking at Navy-Marine Corps innovation and seeing the future of a key joint capability.

Whether it be South Korea, Japan or Australia, in the Pacific the core U.S. allies see the amphibious force as part of their joint force transformation as well.

My recent trip to Australia highlighted the importance of the Navy, Army and Air Force getting the HMAS Canberra right as a key element in their approach to transforming joint forces. And the U.S. Navy and Marine Corps are clearly important partners in working the way ahead to do so.

When I was on USS Wasp last Spring, I had a chance to talk with the Commander of Expeditionary Strike Group Two Rear Adm. Cindy Thebaud.

She discussed the ship integration dynamic involving the F-35B with the Wasp and the ESG, and emphasized that it was not just about the aircraft, but about the integration of the Marines, the airplane, and the fleet.

I had a chance to follow up with her during a visit to Norfolk, Va. to see the Navy's elevated causeway build and exercise.

During the interview, Capt. Michael M. McMillan joined the conversation. McMillan is the Commander of Amphibious Squadron Eight and had just returned from command of the Iwo Jima Amphibious Ready Group off of the waters of Yemen.

FIGURE 14 USS AMERICA DURING PROOF OF CONCEPT DEMONSTRATION. CREDIT: TODD MILLER

Rear Adm. Thebaud described the role of the ESG and the importance of the evolving amphibious capability for the Navy and the Marines.

"My primary responsibility is the readiness of east coast amphibious forces. This includes the ships, the amphibious squadrons, the tactical squadrons that support aviation on the big decks, and the Beach Group, which includes the LCACs, LCUs and Beach Masters. It also includes the amphibious construction battalion which was building the elevated causeway system you saw earlier."

A clear focus is upon shaping integrated combat capability, and getting the Navy and Marine Corps back to their amphibious roots after a dozen or more years of less-traditional deployments. "We need to understand each other's planning processes, capabilities, limitations, the type of missions they might get assigned and ways to work up joint taskings."

With the impact of the Osprey and now the coming of the F-35B, the amphibious task force is much more than a transportation asset, and as such, joint operation capabilities need to be forged, shaped and transformed going forward.

With the refocusing efforts in tandem with platforms like the Osprey and F-35B, the Navy is shifting from a strictly transport force from point A to B to becoming an expeditionary tactical strike and power projection asset as part of the national security equation.

When I asked her about that, Thebaud acknowledged that she sees such an evolution as having an impact on the evolution of the Navy overall.

"We already have 80% of the ships and other major equipment we'll have 20 years from now. The key is to evolve its capability and to draw upon the new systems to shape a more effective combat force," she said.

The evolution of amphibious capabilities will allow the rest of the surface fleet, and the aircraft carriers to evolve as well.

An important aspect of the joint capability, which a dynamically evolving and integrated Navy-Marine Corps capability brings to the fight, is to support what we have called force insertion.

One can come to an area of interest, execute the mission with organic logistics support, and then leave without providing logistics support ashore for possible adversarial use.

When I asked Thebaud about her own experiences along those lines, she noted, "if we look back at the Operation Damayan Philippines relief effort, we brought capability to the crisis to support the relief effort. We stayed as long as necessary and then left.

We came, did the things that needed to get done that were uniquely military to provide the initial response and stabilize the situation, enabled the NGOs and the other organizations to come in that have the intrinsic capabilities to do it over the long haul, and then we left.

While granted, this wasn't a combat operation, the end result was mission accomplished, with minimal residual military footprint left behind."

Capt. McMillan's recent operational experience provided many examples of the evolving capabilities of the Amphibious Ready Group and challenges to be met in enhancing its capability to deliver joint effect.

As McMillan put it, "We felt that what we did during the operation was unique, but I think that over time, our 'unique and unusual' will become the norm."

He added, "Put another way, our unique joint capabilities as a Navy-Marine Corps force can be mixed or matched to deal with a variety of tasks in the battlespace, and that flexibility is probably becoming the norm as a requirement, and we are looking to enhance that flexibility going forward."

Normally, the Navy is supporting the Marines in sustaining their air and ground combat force readiness and operations; the Amphibious Ready Group is supporting the Marine Expeditionary Unit. But with the crisis in

Yemen, there was immediate need for maritime security, sea control and the ability to monitor the situation off of the coast of Yemen and in surrounding waters.

McMillan noted that during his deployment, "The Marines supported the Navy by providing air assets to build the recognized maritime picture, conduct presence ops and non-traditional ISR .

We shaped packages consisting of a mix of the Air Combat Element aircraft to conduct sea control and maritime security missions. In addition, we moved aircraft throughout shipping to enhance flexibility and effectiveness.

For instance, the combination of 3 MV-22s with 3 new Hueys provided the LPD excellent capability for the missions of Tactical Recovery of Aircraft and Personnel (TRAP), Casualty Evacuation (CASEVAC), Quick Reaction Force (QRF) and Rotary-Wing Close Air Support (CAS.).

These flexible packages provided capability, which historically would have only been on the large deck carrier (LHD/LHA), albeit on a smaller scale.

But we were able to provide the 5th Fleet commander with essential core capabilities."

This kind of joint capability can be missed if one simply subsumes this under a notion of historical or classic amphibious operations. And the fleet was able to contribute significant command and control for the force as well.

Notably, the upgrades on the San Antonio-class LPDs provide an added option for command and control not seen historically in the amphibious fleet.

Indeed, in the most recent BALTOPS exercise this summer, USS San Antonio was the flagship for the multi-national exercise, with three Flag officers and elements of their staffs embarked.

But this capability needs to be enhanced throughout the amphibious fleet and Captain McMillian argued that organic ISR and better C2 capabilities need to come to the LSD and the follow on LXR (LSD Replacement) class ships as well.

Another challenge is taking an increasingly capable force, breaking up the assets and chopping them to different command elements.

This is clearly happening with regard to assets such as the Ospreys within the task force, whereby the Combatant Commanders are moving organic assets from the task force and using these assets directly themselves.

The demand side drivers are creating disruptive pressures for the unity of command and control crucial for the combat effectiveness of the ARG-MEU or the amphibious task force.

The triple dynamics of a significant demand signal for forces, coupled with the evolving flexibility of the amphibious forces as joint capabilities, with the shortage of numbers of relevant naval assets overall is almost certainly going to lead to commanders tapping into the amphibious fleet and leveraging its assets.

This is challenging for amphibious commanders.

It is the combination of the price of success at evolving capabilities, flexibility in shaping the tool sets, and the cost of shortfalls in other areas of maritime capabilities.

THE SEA SERVICES TRANSFORM THEIR REACH, PUNCH AND IMPACT IN THE EXTENDED BATTLESPACE

By Robbin Laird and Ed Timperlake

12/23/15

There is a growing literature on the challenges to U.S. forces facing more difficult combat conditions as competitors and adversaries enhance their capabilities.

The anti-access, area denial challenge, in particular, has been a key theme as the sea services face the future; but the Marines and the U.S. Navy as well as coalition partners are transforming their capabilities to fight and definitively win combat engagements throughout this A2AD expanded battlespace.

It is clear that the sea services recognize the challenge but are reshaping their forces to meet that challenge.

And they are doing so through training, technology, innovation, new platforms and new concepts of operations.

With visits to the advanced combat training units of the U.S. power projection services; Marine Air Weapons and Tactics Squadron (MAWTS-1) MCAS Yuma, USAF Weapons School at Nellis AFB, and Naval Strike and Air Warfare Center at NAS Fallon, all have all underscored that the services are working together to deliver combat effects over greater distance and with much greater precision lethality.

Additionally, there is a significant enhanced effort to work with coalition partners, which is a clear part of extending the reach of U.S. combat forces and for the coalition partners as well.

We had a chance recently to discuss the way ahead with regard to enhancing the capability of the sea services and their joint and coalition role in fighting in the expanded battlespace with the head of Air Warfare in the Navy, Rear Admiral Manazir.

The discussion with Manazir was much wider than simply a discussion of how the carrier air wing, and the new carrier was evolving; it was about how the sea services overall were being transformed by the ability to work more effectively with joint and coalition forces.

The focus was on the impact of new platform and technologies but in an interactive relationship with the fleet operating today; transformation is about innovation allowing shaping a new way forward without throwing away combat proven core capabilities, which are capable of modernization.

In 21st Century training terms, this is being shaped and practiced as the U.S. and its allies are building Live Virtual Constructive Training (LVCT) facilities, which can allow for training against adversaries over much greater distances than is possible by simply flying on single service training facilities.

For example, when visiting Richmond Air Base this summer in Australia, we witnessed the Royal Australian Air Force preparing for and then completing its LVCT with the USAF and the Canadian Air Force by means of audio and visual links directly from Richmond to Nellis.

This was one of the first in a growing capability to extend the reach of common training and fighting capabilities via LVCT.

You train as you fight; and you fight as you train.

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When visiting Fallon, we discovered that the U.S. Navy had taken this effort a step further than before.

Through global communications, a Carrier Strike Group in combat could reach back to instructors at NSAWC to improve combat tactics almost real time.

Concurrently, during the Fallon work-up the air wing preparing to go to the next carrier deployment was working directly with real time lessons to carry forward the tradition of the hallmark of Naval/Marine aviators to be "ready on arrival."

According to Rear Admiral Manazir: "LVCT will enable us to train in a more robust environment than we are on our current ranges that are geographically constrained, and currently do not have the full high end threat replicated.

LVCT will allow us to train to the full capabilities of our platforms across a variety of security environments and do so without exposing our training process to an interested adversary."

For Admiral Manazir, the new ships coming online are clearly part of the equation involved in the transformation necessary for the sea services to operate and prevail in the 21st century battlespace.

The integration of the various platforms operating in the surface and subsurface fleet are evolving in a more integrated and interactive manner, which can allow presence assets to reachback to the fleet or to the joint or coalition forces to deliver escalating combat effects, as needed.

Notably, the evolving capabilities of the amphibious fleet provided a significant boost to the capabilities of the sea services.

Rather than simply providing transportation for forces to get into the area of interest, the amphibious fleet, becoming more of a task force, than being a narrowly understood Amphibious Ready Group, provides a powerful persistent presence asset which can deal with a much wider range of tasks and with the new aircraft onboard much greater capability to reach back to the rest of the forces provided by the sea services.

"The Marine Corps has grown in capability from being naval infantry to now having the capability to come from the sea with high-end meshed, networked, honeycombed, resilient capability, with an array of options depending on how you integrate the force.

The sea base itself has a powerful ability strategically to wage war because you don't need a permission slip from a foreign power to use their bases.

The United Stated Navy and the United States Marine Corps singly in the world have retained and modernized the sized capability that allows one to fight a nation with our force rather than just fight another naval force."

Rear Admiral Manazir talked about the new large deck carrier, the USS Ford, in terms of its contribution to the expanded battlespace, and not so much the epicenter of a classic carrier strike group.

He focused on the new ships – the USS America, the USS Ford and the Queen Elizabeth – as providing foundations for 21st century operations.

"The USS Ford is a 21st century naval infrastructure asset, which lives off and further enables the transformation of the air wing.

It's a facilitator for all the things you're going to do off the flight deck.

The electrical generation capacity on the Ford is three times what the Nimitz's is.

It gives you the ability to put greater electronic systems on to the ship.

The ability to have high power requirements with high cooling requirements for your data servers is enabled by the ship.

It has the capacity to be able to support those things and in conjunction with the high-end air wing we're building, you're going to be able to do the missions we discussed earlier more effectively in the expanded battlespace.

The Ford's infrastructure will be partnered with the airplanes that come on and off the flight deck."

In understanding the evolution of the air wing aboard the sea services decks, the F-35 is a crucial element, but it is about accelerating what those services have been building towards for some time, namely the capability to operate force packages across an integrated battlespace.

For sure, the F-35 with its ability to push data across the F-35 coalition, as well as to push data back to the ships is an asset for transformation, but this transformation is itself part of fundamental change in the way the sea services are and will fight in the extended battlespace.

Rear Admiral Manazir views the F-35 as a key information force multiplier.

"We are doing what Bayesian theory talks about, namely we are providing more and more information to get closer to the truth in targeting or combat situation.

One can reduce that fog of war by increased understanding of what actual truth is, you're going to have better effects.

This is why the technology that the F-35 brings to the fight is so crucial. You have decision-makers in the cockpit managing all of this information.

With Block 3F software in the airplane, we will have data fusion where you transform data information to knowledge enabling greater wisdom about the combat situation.

The processing machines in the F-35 provide enough of the fusion so that the pilot can now add his piece to the effort.

This enables the ships to enhance their ability to operate in the networks and to engage with the air fleet in dynamic targeting at much greater distance.

It is about reach not range for the honeycomb enabled expeditionary strike group.

The F-35 is a key enabler of this shift, but it is part of an overall effort to operate in the expanded battlespace."

In other words, the sea services are expanding their reach, remote sensing and precision strike capabilities in the expanded battlespace.

The sea services can operate in wider areas of combat by being networked into an operational honeycomb of forces with reach, range and lethality.

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They are shaping a force capable of operating effectively in discrete but interactive and interconnected force packages.

And they can operate in the domains of air, sea, and space and against land based targets.

This 21st Century technology dynamic makes the synergistic reach of the force much greater than the range of any specific assets operating off of the surface of ship or operating from an airfield.

An F-35 enabled force facilitates reach not range of the entire engagement force.

It is not simply about the forces organically operating of the Ford, or the America or the Queen Elizabeth; it is about their ability to reach into the joint or coalition honeycombed operating force.

Specifically with regard to the large deck carrier, and the USS Ford in particular, Manazir highlighted the synergy between the evolution of the air wing and of the evolution of capabilities built into the ship. He described a shift from thinking about the carrier as the deck which can fly X number of aircraft to thinking of the carrier as a moving epicenter of an extended strike enterprise, that can work with the USAF and coalition partners and live off of their combat capabilities in the expanded battlespace.

"The focus is upon the carrier as a moving epicenter for a netted capability with the joint and coalition force.

It is not about counting the number of airplanes on the deck or projecting the future existence of paper airplanes.

It is about the air wing we are building and how it will operate with the transformed joint and coalition forces we are collectively modernizing.

The approach is to have force structure flexibility with an interconnected extended battlespace.

You can operate as a separate force package; or as a federated force when you are connected but can plug and unplug; you can be interoperable, integrated or interdependent; depending on time, circumstances and mission.

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."

In short, 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 (COIN) slow motion way to fight a war.

It is about the American military standing in parity partnership with allies to demonstrate global agility.

The technology and training ranges exist to develop the con-ops to insert force to achieve discrete and defined objectives, to maneuver in the extended battlespace, to work with allies and joint forces to credibly prevail across the full range of military conflict in any part of the globe.

For the power projection forces –USN/ USMC, USAF with appropriate elements of the US Army, especially Air Defense Artillery – it is about the capability to work across an extended battlespace with flexible means which can be linked together as necessary to prevail in the military and strategic conditions facing the US and its allies in the period ahead.

The capability to go after fleeting targets is enhanced as the sea services shift towards a fifth generation warfare enabled force.

As Rear Admiral Manazir puts the transition:

"With the fifth generation aircraft and their sensors and fused data you can cover a much greater swath of combat space than with legacy aircraft.

And as we sort through how to integrate unmanned systems with F-35s we will be able in a single operational unit cover significant combat space.

You are looking at exponential growth in coverage capabilities to inform the process of generating the combat effects, which you want in that extended battlespace.

And the growth in the ability to generate better target information will allow us to execute strikes within our rules of engagement.

The coming of the F-35 will help in this process.

We train our aviators in the Navy and the Marine Corps to be decision-makers, given the constraints.

A lot of times, we can't apply the rules of engagement we've been given because we can't identify that's a bad guy, whether he's on the ground or in the air.

With better fidelity of information at the forward edge of the battle, I can execute more rapidly as well."

It is about building capabilities at the high end, which have the flexibility to operate through the range of military operations or ROMO.

It is about powerful and flexible force packages which can operate and dominate in specific military situations but be linked to other capabilities to provide the kind of reachback and dominance which effective deterrence requires."

This future is now, the technology, training and tactics is a never-ending work in progress but within reach with sufficient resources.

It is up to the Congress to continue to fund this next chapter in the American way of war.

NEW BRITISH CARRIERS: WORKING WITH THE USN-USMC TEAM TO REDEFINE THE AIR-ENABLED INSERTION FORCE

By Robbin Laird

Front Line Defence

Vol. 12, No. 4, 2015

The British invented carrier warfare – and now, with their new Queen Elizabeth Class of carriers, they are working their own version of the 21st century strike carrier.

Using global lessons learned, they are reinventing the large deck carrier based on the confluence of a number of technologies (some similar to the USS Gerald Ford – CVN-78) and the impact of the F-35B (similar in some ways to the USS America).

Construction of the most complex warship ever built in the UK has reportedly sustained more than 7,000 jobs at more than 100 companies across the country.

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The Royal Navy is currently preparing for sea trials in 2016, and flight trials with Lightning II Joint Strike Fighter aircraft after that.

In late March 2015, I had a chance to visit the first of class of the new generation British carrier, Her Majesty's Ship Queen Elizabeth, and also passed by the rapidly emerging Prince of Wales, which is next in line. The day after the tour, I sat down with Royal Navy and Air Force senior personnel to discuss the way ahead from an operational point of view.

The first thing you notice when you get onboard is how large the flight deck is. I was told it is approximately 90% of the size of a Nimitz Class carrier (which is the largest warship in the world).

The second thing you notice are the two islands aboard the ship.

This is due to the fact that it is not a nuclear carrier and the exhausts for the engines exit on two parts of the flight deck – with an island incorporating those exit points. The forward island is used to operate the ship; and the aft island runs flight deck operations. In a crisis, either can perform both tasks, but in visiting the two islands, it is clear that the designers have focused on ways to enhance the work flow for the two different tasks, namely running the ship and operating the aircraft aboard the flight deck.

HMS Queen Elizabeth is a cross between the notion of a large deck amphibious assault ship, like the USS America, and a strike carrier, like CVN-78 or the USS Gerald Ford (when commissioned).

The ship is designed to handle 40 aircraft: fighters, helicopters, and possibly Ospreys in the future. The current plan is for 24 F-35Bs, 8 ASW helicopters and 5 Crowsnest surveillance systems off of modified Merlin helicopters.

The design emphasizes flexibility, with accommodation for 250 Royal Marines and the ability to support them with attack helicopters and troop transports up to Chinook size and larger. In addition to the innovative JSF F-35B, the Royal Navy will add a new airborne command post to the deck, which will be available for a multiplicity of tasks in ship defense.

With the F-35B, the strike concept will be different from that of the U.S. Navy and its large deck carriers.

As an RAF officer put it: "The plane is so easy to fly, we will focus on getting the maximum effects from the strike force, and not have to focus as much attention to flight choreography as one has to do with legacy aircraft."

FIGURE 15 THE QUEEN ELIZABETH CARRIER. CREDIT: BAE SYSTEMS

The focus is clearly on effects generated from an aircraft carried designed for 24/7 operation.

The F-35B launched from the carriers are part of the picture; the very significant Command and Control capabilities aboard the ship are another. With the carrier afloat, the RAF is looking to build synergy among the various land based and carrier based aircraft to generate combat effects.

As one Royal Navy officer put it: "The strike force could be commanded from the ship, from the ground or from the air. We are building flexible C2 to get maximum combat value from aircraft launched from the carrier."

Several innovations one sees aboard the Gerald Ford can be found aboard HMS Queen Elizabeth: significant power generation, efficient C2 capabilities, very large rooms for reconfigurable C2 suites for operations across the Range of Military Operations (ROMO), and well designed work areas for the F-35B crews which will handle the operations and data generated by the fighter platform to the fleet.

Significant power generation means that future developments can be accommodated, including the probability of the coming of directed energy weapons. The ability to drive the computer power necessary for evolving C2 is significant as well.

Walking through the ship, one sees miles of cable run to support operations, and notably to provide for robust and redundant C2. In fact, both the Ford and QE have prioritized C2 in way that will allow these ships to play key roles in supporting not only a task force at sea but an overall joint or coalition insertion force.

The ship infrastructure is supported by an integrated platform management control system. The IPMS provides integrated management to support operations and combat management. This "brain" of the ship is designed to manage the work flow and provide dynamic information to enable the infrastructure aboard the ship to support sortie generation rates for the mix and match strike force.

In common with CVN-78, the Queen Elizabeth Class has a new way to load weapons and enhance the safety and speed of the weaponization process. It is highly mechanized with advanced automation. Weapons are brought to either end of the deck to be loaded onto the combat aircraft, and the mechanism for loading and moving the weapons can provide a mix and match capacity to push the proper loads to the particular aircraft for individual missions of the day.

According to Captain Chris Alcock, Head of the Carrier Strike Division in Navy Command Headquarters, the introduction of the new large deck carrier will require significant change in the approach of the Royal Navy.

"There are a lot of people that have never been on a carrier before, and the Royal Navy has been, since the demise of the carriers, very much a frigate Navy. We are generating a new Maritime Task Force concept (MTF) to shape the concept of operations going forward. This clearly draws on elements of the past, but requires a fresh think as well.

"People say it's not all about the carrier, but it is all about the carrier, because that will be the center of gravity around which we will provide all the other enablers for the other elements of the task group. The constitution of the task group is critical too, depending on what we do with the carrier, but the carrier and its air wing are the centerpiece enabling the entire task force.

"We have worked closely with the USN and the USMC in the regeneration of Carrier Strike, and that working relationship has been hugely appreciated – and also the work they have done for us and with us in support of this aim," said Capt Alcock.

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Notably, the working relationship with the USMC and its efforts with F-35B integration aboard US Navy ships is a crucial one for the Royal Navy and Royal Air Force (RAF will operate the F-35Bs aboard the carrier).

Group Captain Paul Godfrey, a key RAF officer involved with F 35 Lightning II Entry into Service, described the working relationship with the USMC and USN: "We are training with the Marines and the other air services as we prepare to embark our F-35s aboard the carrier in three years time. And we are very much using this time to think through the marriage between the carrier and the airwing and are looking closely at what the Marines and the US Navy are doing as well.

"In this three year period before we're bringing our F-35Bs back to the UK, and in the four year period we've got before we declare a carrier strike capability 2020, we can have a really good look at how we want to do this. And we are looking at a revolutionary way of doing it, rather than an evolutionary way of doing it."

The Brits and Marines are working closely together to stand up their separate but coordinated capabilities associated with an F-35-enabled 21st century combat force. The F-35 global enterprise is a key enabler of collaborative resources. As their own systems and squadron are stood up in the UK to get ready to work with HMS Queen Elizabeth, the Brits are training on F-35 equipment (including the simulators) at the Beaufort Marine Corps Air Station in South Carolina.

The close working relationship between the Royal Navy and the Royal Air Force with the USMC and the USN was recently on display during the operational trials of the F-35B aboard the USS Wasp in May 2015, one of the last steps prior to the F-35B operationally entering USMC aviation. The Brits are integrated members of VMFAT-501 at Beaufort, and are standing their squadron up there and then will fly to the UK and be declared operational in 2018.

The Brits had engineers, observers and maintainers aborad the Wasp as part of the operational testing, and their experience was part of the preparation for the aircraft and its integration with the Queen Elizabeth over the next few years.

For the last year, Lt. Cdr. Beth Kitchen, OT-1 Evaluations Lead, VFMA-501, for the Royal Navy at Beaufort, has been in South Carolina working with the Marine Corps at Marine Corps Air Base Beaufort.

"Our programs are aligned and they're working in partnership in order to develop the capability of the 35B," she said in a recent interview aboard the USS Wasp during the operational trials. "In terms of this ship deployment, we've got other UK maintainers who have been a part of the detachment.

We've got personnel who are working within the power line with the avionics department, as well as any maintenance control, and they contribute to the maintenance effort in exactly the same way as the Marines are.

They are trained in the same way in the schoolhouse down at Eglin, but the Marines are also looking at how the UK conducts maintenance and how that can possibly be involved in the future."

In other words, the Brits are integrated members of the squadron, and the Marine Corps and British maintainers are learning together to adapt their different protocols to a common airplane.

Obviously, this will pay real dividends down the road in terms of being to cross deploy at sea.

It is important to fully understand what insertion forces can do for a nation when a mission can be effectively correlated with objectives set by political decision makers. When publics and governments are looking for

alternatives to parking land forces in areas for long periods of time, and achieving mixed, negative or uncertain results, the carrier is emerging as a viable option.

Put bluntly, publics are tired of long ground campaigns but like to see national interests being projected and protected. Insertion forces built around integrated air, ground and sea power is a core enabler of being able to act rapidly to influence events – and not simply occupy terrain until war weariness crushes strategic objectives.

Both the UK public and decision makers will soon have a much wider range of options without having to deploy forces ashore for long periods of time, unless the interest, the need and the support is available to do so.

The coming of the Queen Elizabeth Class carrier provides strong strategic options that are simply missing from today's UK defense forces; and it fits into where other allies are moving as well.

http://frontline-defence.online/article/2015/4/2149

THE IMPACT OF THE F-35B: STRATEGIC DETERRENCE WITH TACTICAL FLEXIBILITY

By Ed Timperlake

5/27/12

Every fighter pilot has had or will have a moment in the air when the biggest indicator in the cockpit is showing how much fuel is left: the fuel indicator immediately can dominate the pilots attention and really focus thinking on where to immediately land.

Fuel is measured in pounds usually with an engineering caveat stating a degree of uncertainty over how low the number may go before all the noise will stop. Pounds of fuel remaining eventually become everything.

It is actually a very simple and terrifying equation, no fuel means simply no noise because the jet engine has stopped working.

Contemplating this very time sensitive dilemma, when the "noise gage" goes to zero, all pilots know that their once trusted and beautiful sleek multi-million fighters that they are strapped into will rapidly take on the flying characteristic of a brick.

Running low on fuel, calling "bingo," on the radio which is announcing min fuel left for a successful recovery and then realizing you are actually going below "bingo" could occur for a variety of reasons.

In peacetime it is mostly a delay in landing because of weather related issues.

In combat, in addition to horrific weather at times, throw in battle damage to the fuel tanks and it becomes a real life or death problem.

In peacetime you can eject, probably lose your wings and that will be that.

However, in combat, in addition to shooting at you the enemy always gets a vote on other methods to kill you and destroy your aircraft. They will use any means possible.

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Consequently if aircraft in their combat strike package get lucky and a few survive to bomb "homeplate" taxiways and all divert fields it can become a significant problem.

Even more realistically in this 21st Century world, missile proliferation, both in terms of quality and quantity, is a key challenge. All nations can be peer competitors because of weapons proliferation.

An enemy may have successfully improved the quantity and quality of their missile such that an Air Battle commander's entire airborne air force can be eliminated by the enemy destroying all runways, taxiways and divert bases.

In a war at sea, hitting the carrier's flight deck can cripple the Carrier Battle Group (CBG) and thus get a mission kill on the both the Carrier and perhaps even the entire airborne air wing if they can not successfully divert to a land base.

With no place to land, on the sea or land and with tanker fuel running low, assuming tankers can get airborne, the practical result will be the loss of extremely valuable air assets.

In such circumstances, The TacAir aircraft mortality rate would be the same as if it was during a combat engagement with either air-to-air or a ground –to-air weapons taking out the aircraft.

The only variable left, between simply flaming out in peacetime, vice the enemy getting a kinetic hit would be potential pilot survivability to fly and fight another day.

However, with declining inventories and limited industrial base left in U.S. to surge aircraft production a runway kill could mean the loss of air superiority and thus be a battle-tipping event, on land or sea.

Now something entirely new and revolutionary can be added to an Air Force, the VSTOL F-35B.

Traditionally the VSTOL concept, as personified by the remarkable AV-8, Harrier was only for ground attack. To be fair the RAF needed to use the AV-8 in their successful Falklands campaign as an air defense fighter because it was all they had.

The Harrier is not up to a fight against any advanced 4th gen. aircraft—let alone F-22 5th Gen. Fighters that have been designed for winning the air combat maneuvering fight (ACM) with advanced radar's and missiles.

Now though, for the first time in history the same aircraft the F-35 can be successful in a multi-role.

The F-35, A, B &C type, model, series, all have the same revolutionary cockpit-the C4ISD-D "Fusion combat system" which also includes fleet wide "tron" warfare capabilities.

http://www.sldinfo.com/the-f-35-as-a-%E2%80%9Cflying-sensor-fusion-engine%E2%80%9D-positioning-the-fleet-for-%E2%80%9Ctron%E2%80%9D-warfare/

There has been a lot written about the F-35B not being as capable as the other non-VSTOL versions such as the land based F-35A and the Large carrier Battle Group (CBG) F-35, the USN F-35C.

The principle criticism is about the more limited range of the F-35B. In fact, the combat history of the VSTOL AV-8 shows that if properly deployed on land or sea the VSTOL capability is actually a significant range bonus. The Falklands war, and recent USN/USMC rescue of a Air Force pilot in the Libyan campaign proved that.

The other key point is limited payload in the vertical mode. Here again is where the F-35 T/M/S series have parity if the F-35B can make a long field take off or a rolling take off from a smaller aircraft carrier-with no traps nor cats needed it can carry it's full weapons load-out.

The Royal Navy just validated this point by reversing back to the F-35B.

http://www.sldinfo.com/the-uk-rethinks-the-f-35c-decision-shaping-a-british-led-expeditionary-strike-group/

http://www.sldinfo.com/the-uk-allies-and-re-thinking-the-f-35c/

Give all aircraft commanders the same set of strategic warning indicators of an attack because it would be a very weak air staff that would let their aircraft be killed on the ground or flight deck by a strategic surprise.

Consequently, the longer take off of the F-35 A, B or C with a full weapons complement makes no difference. Although history does show that tragically being surprised on the ground has happened.

Pearl Harbor being the very nasty example. Of course, USN Carrier pilots during the "miracle at Midway" caught the Japanese Naval aircraft being serviced on their flight deck and returned the favor to turn the tide of the war in the pacific.

In addition to relying intelligence, and other early warning systems to alert an air force that an attack is coming so "do not get caught on the ground!" dispersal, revetments and bunkers can be designed to mitigate against a surprise attack.

Aircraft survivability on the ground is critical and a lot of effort has also gone into rapid runway repair skills and equipment to recover a strike package. All F-35 TMS have the same advantages with these types of precautions.

The strategic deterrence, with tactical flexibility, of the F-35B is in the recovery part of an air campaign when they return from a combat mission, especially if the enemy successfully attacks airfields.

Or is successful in hitting the carrier deck-they do not have to sink the Carrier to remove it from the fight just disable the deck. War is always a confused messy action reaction cycle, but the side with more options and the ability to remain combat enabled and dynamically flexible will have a significant advantage.

With ordinance expended, or not, the F-35B does not need a long runway to recover and this makes it a much more survivable platform — especially at sea where their might be no other place to go.

A call by the air battle commander-all runways are destroyed so find a long straight road and "good luck!" is a radio call no one should ever have to make.

But something revolutionary now exists.

In landing in the vertical mode the Marine test pilot in an F-35B, coming aboard the USS Wasp during sea trials put the nose gear in a one square box. So the unique vertical landing/recovery feature of landing anywhere will save the aircraft to fight another day.

It is much easier to get a fuel truck to an F-35B than build another A or C model, or land one of the numerous "decks" on other ships, even a T-AKE ship then ditch an F-35C at sea.

This unique capability can be a war winning issue for countries like Israel, Taiwan and the U.S. Navy at sea.

Second Line of Defense

TRANSFORMING THE POWER PROJECTION FORCES FOR THE LIBERAL DEMOCRACIES

By Robbin Laird

9/12/16

The period ahead could be a very deadly one for the liberal democracies.

Ill-liberal powers whether they be states (Russia, China or Iran) or irredentist movements spouting 12th century values are clearly working to change the global order to their advantage.

Many factors of power are in play, but clearly one of them is military.

And if the liberal powers can learn to not dissipate their military capabilities and investments in nation building and other diversions, the reshaping of insertion forces able to meet threats and to meet clearly established political objectives can be strengthened.

Indeed, the decade ahead can be one of significant transformation for the military forces of the liberal democracies.

Most of the platforms necessary for transformation already exist; what is needed is more investment in standing up the new force and commitment to the culture change which a transformed military can deliver.

Also, crucial is changing the culture of the "high priests of strategy" who can find many places to send the military to serve metaphysically defined rather than Realpolitik objectives.

There needs to be a transformation of the strategic culture to recognize that setting clear and limited objectives and achieving clearly delaminated strategic objectives is necessary prior to sending the military as errand boys for abstract and undefined objectives.

Building the Honeycomb Modular Power Projection Force

Earlier, in our 2013 book on **The Remaking of American Military Power in the Pacific: A 21st Century Strategy**, we argued that a new approach to military transformation and engagement between the U.S. and allies and partners in the Pacific was necessary to protect the interests of the liberal democracies in the Pacific.

The evolution of 21st century weapon technology is breaking down the barriers between offensive and defensive systems. Is missile defense about providing defense or is it about enabling global reach, for offense or defense? Likewise, the new 5th generation aircraft have been largely not understood because they are inherently multi-mission systems, which can be used for forward defense or forward offensive operations.

Indeed, an inherent characteristic of many new systems is that they are really about presence and putting a grid over an operational area, and therefore they can be used to support strike or defense within an integrated approach. In the 20th Century, surge was built upon the notion of signaling. One would put in a particular combat capability – a Carrier Battle Group, Amphibious Ready Group, or Air Expeditionary Wing – to put down your marker and to warn a potential adversary that you were there and ready to be taken seriously. If one needed to, additional forces would be sent in to escalate and build up force.

With the new multi-mission systems – 5th generation aircraft and Aegis for example – the key is presence and integration able to support strike or defense in a single operational presence capability. Now the adversary can not be certain that you are simply putting down a marker.

This is what former Air Force Secretary Michael Wynne calls the attack and defense enterprise.

The strategic thrust of integrating modern systems is to create an a grid that can operate in an area as a seamless whole, able to strike or defend simultaneously. This is enabled by the evolution of C5ISR (Command, Control, Communications, Computers, Combat Systems, Intelligence, Surveillance, and Reconnaissance), and it is why Wynne has underscored for more than a decade that fifth generation aircraft are not merely replacements for existing tactical systems but a whole new approach to integrating defense and offense.

When one can add the strike and defensive systems of other players, notably missiles and sensors aboard surface ships like Aegis, then one can create the reality of what Ed Timperlake, a former fighter pilot, has described as the F-35 being able to consider Aegis as his wingman.

By shaping a C5ISR system inextricably intertwined with platforms and assets, which can honeycomb an area of operation, an attack and defense enterprise can operate to deter aggressors and adversaries or to conduct successful military operations.

Inherent in such an enterprise is scalability and reach-back. By deploying the C5ISR honeycomb, the shooters in the enterprise can reach back to each other to enable the entire grid of operation, for either defense or offense.

http://www.sldinfo.com/crafting-an-attack-and-defense-enterprise-for-the-pacific/

U.S. forces and policies in the region provided a crucial lynchpin providing the reachback and dominance necessary to protect national and allied interests.

The intersection of honeycombed force packages operating as modules and interconnected through networks will allow US and allied forces to shape a distributed force into the area of interest, and to provide strike and defense capabilities throughout a combat or spider's web of operational capabilities.

An Update from British, Australian and American Forces

Since we published that book in 2013, we have had the chance to talk extensively with British, Australian and American military innovators who are creating the reality, which we projected in our book.

And new combat systems have come into being which are providing key building blocks for the new approach such as the Wedgetail, the A330MRTT, the F-35 and the P-8/Triton combination.

In effect, a new foundation is being laid for the decade ahead in the transformation of the power projection forces and lessons learned by the warriors in combat, exercises and training will shape the way ahead for the decade after next.

Even though some technologies can be identified as important to the next decade, it will be through the shaping of a new paradigm through which new platforms will then be built and along with them incorporated or adjacent technologies.

http://www.sldinfo.com/rear-admiral-manazir-in-australia-allied-convergence-on-the-kill-web/

From the discussions with the US and allied warfighters, a number of key characteristics can be identified with regard to key elements of the new paradigm of the kill web, or the honeycomb operational force.

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The decade behind us was one where the platforms became connected and the joint and coalition force learned to leverage the benefits of such a force.

Now that is assumed, and the build forward is now to shape an distributed but integrated force.

First, platforms are expected to be interoperable.

If they are not, then they need to be replaced. The Australian Plan Jericho has been exploring among other things, how to bring those platforms considered important which are not interoperable with the combined force into the picture.

For example, in a Jericho Dawn exercise held last March, the Aussies sought to find ways to take an important Army asset, the Tiger assault helicopter, and to connect it to the RAAF's air combat force.

According to an Australian Ministry of Defence press release on March 21, 2016, the exercise was described as follows:

Our Army is focussed on two key areas to ensure improved air-land integration. The first is to deliver better communication systems to ensure an agile, efficient and timely response to an intelligent, well-armed and motivated adversary," said Major General McLachlan.

"The second is to advance how we plan and conduct air-land operations to deliver the right effect, at the right place, at the right time.

"The demonstration highlights how we can better harness the strengths of our team by digitally connecting air and land platforms…..

Capabilities involved include RAAF's C-17A, AP-3C, KC-30A, E-7A Wedgetail and FA-18 Hornet aircraft, as well as the Army's air-land enablers from the 16th Air Land Regiment, Tiger armed reconnaissance helicopters from 1st Aviation Regiment, and vehicles and equipment from the Combined Arms Training Centre.

http://www.sldinfo.com/jericho-dawn-the-aussies-shape-21st-century-ground-maneuver-forces/

Second, platforms are expected to be integratable from the ground up.

As Air Marshal Leo Davis put it:

"It is like a jig saw puzzle.

You have these really nice pieces to the puzzle sitting in the container, but until you begin to look at the picture your trying to create through the overall puzzle, you do not know which bit goes where."

With regard to F-35 as an example, Davies argued the following:

"I think Joint Strike Fighter on its own, a fifth generation air combat aircraft, could be regarded as just an air combat aircraft.

If you want to shoot the bad guy down, if you want to defend the battle space for a land maneuver or for a maritime strike, that's fine.

But what we're beginning to appreciate now is that it's not just an air combat asset it is also an ISR node.

If you were to then put two more pieces of your puzzle down and go, "Well that's starting to form a bit of a picture here," in the center of your puzzle. "

What else could I do if it was truly an ISR node?

How do I manage that asset differently than if it was just going to shoot down another fighter?"

Although the puzzle analogy suggested an overall approach what he really was focusing on the interaction between the evolving bigger picture, and relooking at what each piece of the puzzle might be able to do in fitting into a new puzzle big picture so to speak.

"How would you operate the air warfare destroyer differently as you add a Wedgetail, a P-8, a Triton or an F-35 to its operational environment?

And conversely, how could the changes in how the destroyer would operate as you evolve systems on it, affect how you operate or modernize the other pieces of the evolving puzzle?"

And to clarify what this means for platform acquisition, Air Marshal Davies discussed the Tiger case.

"I know it's a little unfair, but we would probably rethink the combat system on Tiger if we were to buy an armed reconnaissance helicopter tomorrow. Having flown the airplane, I don't have any issue with the airplane that is Tiger. But how do you integrate it? At the moment it is less than ideal in terms of integration."

He argued that it was crucial to have a realistic and broad view with regard to force design in mind as one thinks about adding platforms, and a large portion of that force design needs to revolve around "integratability."

http://www.sldinfo.com/mastering-the-reshaping-of-the-joint-force-capability-puzzle-a-discussion-with-air-marshal-davies-of-the-royal-australian-air-force/

Third, systems are expected to be upgradeable from the ground up. A new approach to integratability is associated with what might be called the coming of software upgradeable aircraft, such as the P-8/Triton, F-35 or Wedgetail.

Software upgradeability provides a key opportunity to evolve the capabilities of an air combat platform without having to change the hardware and correlated software configurations through a complicated upgrade process.

And the software will evolve with the evolution of the threat and the coming of additional opportunities to shape a "new" aircraft, which will look the same but not operate the same in the battlespace. That is the point about software upgradeability.

http://www.sldinfo.com/the-software-upgradeable-combat-aircraft-the-case-of-the-p-8/

The introduction of software upgradeable systems introduces a new dynamic as well.

Clearly, the manufacturer needs tight configuration control over the core systems software.

That is clear; but the shift is to shape an application layer on top of the core systems software, which can be introduced much more rapidly.

The military is envisaging their own version of the Apple development, modernization and migration model.

In an interview with the RAF ISTAR force commander, the importance of integrated upgradeability was seen as crucial to shaping the evolving force.

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As the core platforms are replaced by an all software upgradeable fleet, the possibility could exist to put the platforms in competition with one another for modernization upgrades.

"Which upgrade gets the priority for which platform to make the greatest contribution to the integrated ISTAR capability are the sort of decisions that should lie with the ISTAR Force in the future – it is at Force level, not within individual programmes and projects that the overall capability benefit can be seen and prioritized."

We then discussed the notion of transformation as a process, not an outcome.

The Air Commodore was very keen to stress again the need for "cultural change, where the aperture is opened for the team and they can embrace greater integration"

"We have the iPhone 6 generation in the Force now, yesterday's analogue approach to our business is no longer appropriate.

"With the aperture fully open, the individual platforms and capabilities become the apps that enable the integrated Force 'iPhone'.

"Thinking of it in this way, will allow us to tap this new generation of warriors."

http://www.sldinfo.com/transforming-the-royal-air-forces-istar-force-a-discussion-with-air-commodore-dean-andrew/

Fourth, the platforms function in networks but it is not about some giant global network, which can be disrupted; it is about force packages operating as modules working together to achieve objectives and their power extended as they are connected with other force packages.

In effect, the senior commander's roles, which shift to assembling, deploying, evaluation and augmenting or withdrawing force packages as dynamic tasks, are achieved. It is not about managing the tactical details of forward deployed operations.

For example, work at 2nd Marine Expeditionary Brigade is focused on shaping such a capability.

2d MEB is clearly focused on working international naval relationships, which played a key role in Bold Alligator 2014 and Exercise African Lion 2014, the largest exercise on the African continent.

In Bold Alligator (2014), the Marines worked an interwoven C2 relationship with the Dutch, who also commanded the USS Arlington, a new US Navy LPD, and worked for and adjacent to the Navy-Marine Corps construct.

Coalition participation required installing CENTRIXS, an allied communication system, on the USS Kearsarge, which improved the forces' readiness for future crisis and contingency operations.

Throughout the exercise, 2d MEB experimented with various configurations of MAGTF C2 support for operations by leveraging the enhanced US and allied seabase.

In order to facilitate C2 aboard limited amphibious ships, 2d MEB experimented with a robust reachback capability.

Reachback capability allowed 2d MEB to deploy a small part of the staff on ships but employ the whole staff using modern communications technology from a land-based structure given the ships' space constraints.

2d MEB is a standing operational HQ with no forces assigned.

This provides flexibility to GCCs. Because 2d MEB was designed with its most likely mission in mind – crisis response – the unit needs to be able to deploy and provide C2 within 24 hours after heeding a GCC's request.

The lack of force structure outside the CE allows the unit to serve as the Swiss army knife of C2 for the GCC.

2d MEB can deploy the CE and composite joint and international forces already close to the operating area.

The flexibility of the MEB CE also allows the unit to deploy and employ scalable force packages of as little as a few thousand personnel for crisis response and up to 15,000 for its most deadly mission – small-scale conventional warfare.

This is important for warfighting and operating throughout the ROMO the MC engages in.

http://www.sldinfo.com/2d-marine-expeditionary-brigade-shaping-the-scalable-modular-forces-for-21st-century-operations/

The leadership of the Australian Navy has highlighted as well the importance of flexible task forces in reshaping combat power.

The foci of both Vice Admiral Barrett, Chief of Navy, and Rear Admiral Mayer, Commander Australian Fleet, at the recent Air-Sea integration conference held by the Williams Foundation is upon re-energizing the task force concept, but in terms of modular force packages which include, Army, Navy and Air Force capabilities configured to achieve the mission with appropriate tool sets.

It is a Swiss army knife concept of operations using modular force packages operating as a honeycomb to achieve the desired combat effect.

http://www.sldinfo.com/vice-admiral-barrett-on-the-way-ahead-of-the-australian-navy-design-the-force-for-decisive-and-distributed-lethality/

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

Fifth, sustainability has to be built into the force.

Military leaders are looking for the new systems to significantly more maintainable in order to provide for higher reliability and dispatch rates.

This is about designing into systems ways to ensure that the platforms are more sustainable; and because the key foundational platforms are often multi-national systems – such as F-35, P-8, Triton, A330MRTT – the expectation is that they can be globally sustainable.

And this means cross-maintainable with core allies when operating in a common area of interest.

Sixth, the force is expected to be able to contribute and to operate in a secure manner within a distributed battlespace and commanded by a distributed C2 package.

C2 is become an essential element for force structure transformation, rather than focusing excessively on the ISR, or collection of information to inform decisions.

The shift from the kinds of land wars fought in the past decade and a half to operating across the range of military operations to insert force and to prevail in a more rapid tempo conflict than that which characterized

counter-insurgency operations carries with it a need to have a very different C2 structure and technologies to support those structures.

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

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

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

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

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

It was not about micro managing the combat assets.

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

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

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

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

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

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

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

As Robert Evans, a former USAF pilot, and most recently with Northrop Grumman put the change:

Formations of F-35s can work and share together so that they can "audible" the play. They can work together, sensing all that they can sense, fusing information, and overwhelming whatever defense is presented to them in a way that the legacy command and control simply cannot keep up with, nor should keep up with.

That's what F-35 brings.

If warfighters were to apply the same C2 approach used for traditional airpower to the F-35 they would really be missing the point of what the F-35 fleet can bring to the future fight.

In the future, they might task the F-35 fleet to operate in the battlespace and affect targets that they believe are important to support the commander's strategy, but while those advanced fighters are out there, they can collaborate with other forces in the battlespace to support broader objectives.

The F-35 pilot could be given much broader authorities and wields much greater capabilities, so the tasks could be less specific and more broadly defined by mission type orders, based on the commander's intent. He will have the ability to influence the battlespace not just within his specific package, but working with others in the battlespace against broader objectives.

Collaboration is greatly enhanced, and mutual support is driven to entirely new heights.

The F-35 pilot in the future becomes in some ways, an air battle manager who is really participating in a much more advanced offense, if you will, than did the aircrews of the legacy generation.

http://www.sldinfo.com/the-coming-of-the-f-35-and-the-dynamics-of-change-in-air-force-c2-systems/

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

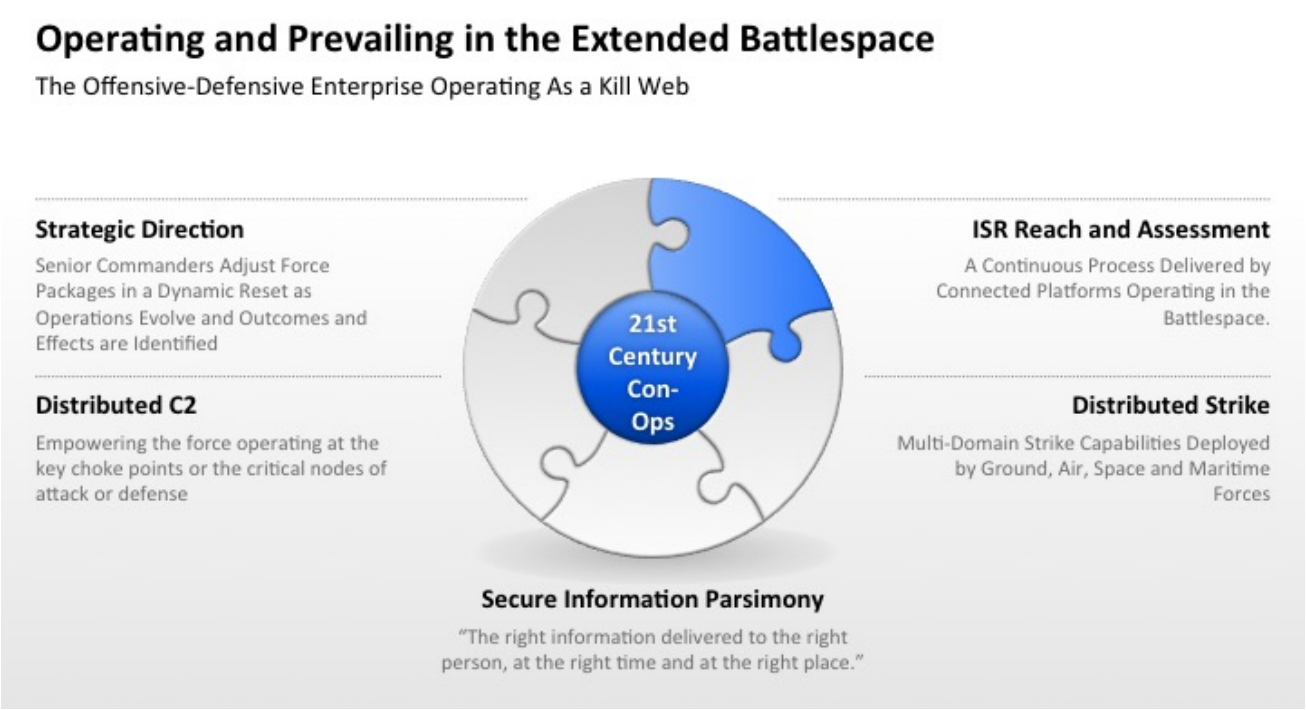

FIGURE 16 F-35 IS DESIGNED TO SUPPORT THE EVOLUTION OF A DISTRIBUTED COMBAT FORCE. CREDIT: SECOND LINE OF DEFENSE.

Second Line of Defense

In fact, the former MARFORPAC, Lt. General Robling, underscored to central importance of distributed C2 for a deterrence in depth strategy in the Pacific.

The Australian military is small in comparison to the US, but it is a lethal and technologically sophisticated force.

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

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

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

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

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

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

http://www.sldinfo.com/the-distributed-laydown-in-the-pacific-and-deterrence-in-depth-lt-general-robling-discusses-the-evolution-of-the-usn-usmc-team-in-the-pacific/

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

Building Platforms After Next

The need to operate at greater distance and to deal with a growing diversity of threats has highlighted the importance of ensuring an ongoing modernization effort to enhance that the liberal democracies have the capabilities to fight as a an integrated team in that battlespace.

This requires capable platforms, which can perform their core missions but to do so with greater effect by being more capable through the connectors or enablers for a more integrated force.

Each of the key platforms has a set of core functions, yet their impact is enhanced by inter-connectivity and determining how best to operate those platforms in ways which enhance the overall capabilities of the force.

When approaching the question of the acquisition of new platforms, a key consideration needs to be what does that platform bring to the integrated battlespace?

Posing the question in this way then drives a different way to think about those new platforms which might be added to the force.

How can its organic capabilities enhance the capability of the force to provide for an integrated effect?

How can the platform contribute to the multiplier effect of its operation within the battlespace?

How can the force best survive and prevail and how do new platforms contribute to that effort?

How upgradeable is the platform with regard to the other key capabilities operating in the battlespace?

How can the central role of software upgradeability best be recognized and supported in building out an information secure, decision dominant force?

How to measure cost effectiveness in an integrated battlespace world?

How do new approaches to sustainability built into 21st century systems get recognized as cutting edge ways to have a more effective and sustainable force, rather than being audited to death by 20th century practices and thinking?

The most expensive acquisition could well be one that is the cheapest up front in terms of initial price tag, but is not an effective member of an integrated battlespace.

Such platforms might only contribute to a narrow function without any real capability to evolve with the forces shaping a way ahead to reshape capabilities to achieve key effects in the evolving battlespace and within that battlespace shaping an open-ended force integration process.

In short, the decade of innovation underway can lay the foundation for a new approach to platform acquisition, which can get out of the platform centric ghetto that is so often the only lane in which platforms are discussed, considered and bought.

Second Line of Defense