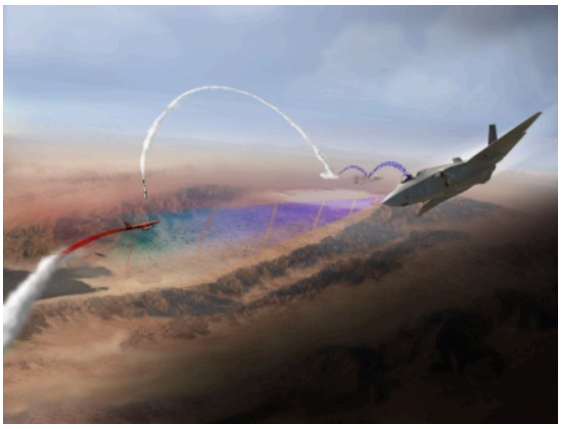
The Strategic Shift: The Role and Impact of the F-35 Global Enterprise



4/15/19

By Dr. Robbin F. Laird and Ed Timperlake

The liberal democracies are facing a key strategic shift from a primary focus on the land wars in the Middle East to facing the challenges posed by peer competitors. The Pentagon has referred to this as the return of Great Power competition which requires a significant shift from the forces configured for global deployments against adversaries found in Counter-Insurgency environments to having forces able to compete in higher intensity competition and to engage in and prevail in crisis management situations with peer competitors. This report looks at how the F-35 global enterprise is a key enabler, driver or trigger to the force structure changes to enable the liberal democracies to do so.

The Strategic Shift: The Role and Impact of the F-35 Global Enterprise

BY DR. ROBBIN F. LAIRD AND ED TIMPERLAKE

Defense.info

PART I: THE RETURN OF DIRECT DEFENSE AND THE STRATEGIC SHIFT FOR THE WEST

The U.S. military has been focused along with core allies in dealing with counter-insurgencies for two decades, which represents a defining generation of combat experience for the joint, and coalition force.

We have an entire generation of military officers with little or no experience in dealing with the direct threat from peer competitors or operating in contested air and maritime space.

With the return of great power conflict and the return of core nuclear questions with the coming of a second nuclear age, force structures are changing along with concepts of operations as well as the need for relevant and effective crisis management strategies.

A strategic shift is underway for the military establishments in the liberal democracies.

For the past decade, the military has primarily focused its training and operations dealing with counter-insurgency and stability operations. Now the need to deal with operations in contested air and sea space from adversaries who can bring significant capability to bear against U.S. and allied forces requires a significant reset of efforts.

It is a strategic space in which operations in contested settings is where the military will operate. It is about learning how to deal with the policies and capabilities of peer competitors who are seeking strategic and military advantage against the liberal democracies.

And this challenge is one which will require the civilian leadership to come to terms with the challenge of crisis management in which escalation and de-escalation will have to be mastered as a strategic art form.

It is not just about sending off the military to fights thousands of miles away and welcoming them back from time to time. It will be about facing the adversary squarely and forcing his hand and shaping outcomes to the benefit of the liberal democracies against those of the illiberal powers, and by doing so with using military means as one of the key tool sets

The nature of the threat facing the liberal democracies was well put by a senior Finnish official in a recent briefing: “The timeline for early warning is shorter; the threshold for the use of force is lower”.

What is unfolding is that capabilities traditionally associated with high end warfare are being drawn upon for lower threshold conflicts, designed to achieve political effect without firing a shot.

Higher end capabilities being developed by China are Russia are becoming tools to achieve political-military objectives throughout the diplomatic engagement spectrum.

The non-liberal or authoritarian powers are clearly leveraging new military capabilities to support their global diplomacy to try to get outcomes and advantages that enhance their position and interests.

The systems they are building and deploying are clearly recognized by the Western militaries as requiring a response; less recognized is how the spectrum of conflict is shifting in terms of using higher end capabilities for normal diplomatic gains.

The Nature of the Challenge

The challenge posed by competitors such as modern China and Russia is both significant and different from what the Western democracies have seen both in the recent past and during the Cold War.

Defense.info

The Western democracies are in a fundamentally different historical era. Russia is not the Soviet Union. And the Chinese military is not Mao's People's Liberation Army (PLA). There are lessons learned from the past and domain knowledge, which can be leveraged but we need to shape new ways to use military force and to exercise crisis management in the new strategic period as well.

The Western democracies must also try and learn what they don't know.

Effective military organizations around the globe respect what Secretary Rumsfeld once sagely called "the unknown unknowns"

This problem was put very clearly in a recent interview with the commander of the Royal Australian Air Force's Air Warfare Centre (CDRAWC), which is totally focused on joint warfare as the driver for change.

Throughout the interview, CDRAWC was very clear on the importance of breaking out of legacy patterns and thinking, and finding ways to train for the future fight with the force the RAAF is crafting, and to respect what one doesn't know.

"Our senior leadership, including myself, has never grown up in the combat environment which is now evolving rapidly. We need to unlearn as well as learn to shape an effective way ahead."

"The change is to effectively shape a future force structure based on where you need to go, rather than what you have inherited?

And this is not just true for the military but for civilian strategists, policymakers and politicians.

What is the nature of conflict the Western democracies are facing posed by peer competitors?

How do the Western democracies compete more effectively?

How do the Western democracies protect their way of life?

How do the Western democracies prevail in the conflict with the illiberal societies?

As the Chief of the Australian Navy, Vice Admiral (now recently retired) Tim Barrett put it bluntly: "We are not looking at conflict between platforms, or segments of the military against adversaries. It is a fundamental test of conflicting approaches to conflict and to warfare."

This comment put the challenge where it needs to be, namely, the demand set is broadening as the range of tools for conflict also increase; and the potential impact from miscalculations are ramping up with the consequences for prolonged armed conflict among peer competitors.

What is clear now is that a new phase is beginning which requires clear-headed analysis and preparation of tool sets, which can effectively protect the ways of life and strategic interests of the liberal democracies.

The tectonic plates are shifting and the liberal democracies need to think carefully about the prospects and consequences of these profound changes between (and within) nations, and how best to respond to this new world order (or disorder).

Security threats have unleashed national reactions with various nations seeking to rebalance their position in the global order, and seeking to work with clusters of either like-minded states, or with states capable of providing key needs.

It is not exactly the return of nationalism, for that has not been absent in any case, but is clearly the return of security and defense concerns as a priority, and these concerns are always led by states seeking allies, partners or friends, or "the enemy of my enemy is my friend" types of partners.

Put in other words, the return of hard power combined with various other tool sets is being exercised to try to reshape the global situation to the advantage of the illiberal powers.

A Clear-Headed Look at the Illiberal Powers

The shifting nature of the global competition and the need to deal with the world as it is or is becoming rather than the world which the Western liberal democracies might wish to see. This means dealing with the return of great power competition and politics, but without missing the new strategic contexts within which this completion is unfolding as well.

Even if globalization is not leading to global peace and brotherhood, it has created new conditions within which competition is unfolding. Key elements of global reach will remain relevant in the new situation, such as the reach of global information, cyber threats, and information war, as key interactive tools, which will be as disruptive as they are binding.

And the reach of global information into sub-regional groups can well lead to new types of disintegration and integration as well.

The well- known and well-regarded Australian strategist Dr. Ross Babbage has highlighted in his work, the crucial importance of understanding the nature of the strategic competitors to the liberal democracies, notably China and Russia, and how they are reshaping their forces and engaging in a wide range of cyber and other intrusions within liberal democratic societies.

As Babbage put it in an interview with us:

"The starting point for any discussion of threat facing Australia and its allies clearly is the nature of the regimes we are dealing with. This is something even many people in government don't fully understand. These are Leninist regimes of a fairly sophisticated type. They're different in some respects, but their overall goals are very similar."

For the West, the tendency is to think that there is peace and there is war with nothing much in between.

For a Leninist regime, there is a broad area in between peace and war in which they believe one can aggressively contest the adversaries of these regimes and engage in political warfare and use their militaries to enhance their influence.

Put in other terms, a much broader gray zone has been created within which the authoritarian regimes are contesting the liberal democracies with little fear of direct retaliation.

"And both regimes, have got great political stories to tell domestically to support their foreign policy actions. For Russia it is about restoring Russian influence and power status and rebuilding a buffer zone.

"And doing so enhances the Russia's abilities to act elsewhere. For Beijing, it is about restoring the Chinese civilization's globally dominant position to it's their rightful place. Recently Xi Jinping has emphasized that they will spill blood if required to achieve their rightful place in the world."

And when one looks at the nature of their domestic systems, the ever-present role of repression and tight regime control is obvious.

Defense.info

"For the Russians, the national leadership comes largely from intelligence and security force backgrounds. With the Chinese, the government has developed and is developing high-technology control mechanisms, which include powerful sets of incentives to comply with the regime's policies.

"They have a vast national database on their citizens, something which would be completely illegal in the liberal democracies. They have developed a Social Credit System whereby they monitor citizens and evaluate their behavior and can build detailed report cards on their citizens. And dependent upon your grade, so to speak, you can receive or be denied credit for things like work promotions and foreign travel."

"In effect, the Russian and Chinese regimes are consolidating internal controls and are expanding their capability to operate in the gray zone internationally to reinforce their domestic and international authority.

"They're waging political warfare using a very wide spectrum of instruments right now; whereas the liberal democracies continue to think of warfare as a radical shift from the normal condition, which is peace. Since the Cold War the West has paid little serious attention to operations in the gray zone."

Dr. Babbage sees growing recognition in for the US and the allies about the nature of the challenges facing both countries. "To respond is not simply about military capabilities; it is about whole of government capabilities and indeed whole of nation and whole of alliance capabilities."

"And we need to have a much more open and frank discussion with our publics about the nature of the challenges we are facing. I think the starting point is to share factual stories about what the Chinese and the Russians are actually doing both within their own societies and also within ours.

"The challenge we are facing is fundamental and requires us to take a hard look at how the Chinese and Russians are already operating against our interests internationally and simultaneously seeking to undermine the liberal democracies from within."

https://sldinfo.com/2018/03/the-changing-of-the-threat-envelope-for-australia-the-perspective-of-ross-babbage/

The Strategic Shift and Peer-to-Peer Conflict

The operational area between full scale war and peace is clearly expanding and as such a key challenge for the forces and leadership in the liberal democracies.

As the Chief of Staff of the RAF put it in a speech in 2018:

Hybrid warfare as we know will continue to be a significant feature of strategically contested environments, in which actors will see to blur the boundaries between peace and war and engagement of attributable and non-attributable activities below the threshold on force conflict. The theme today is clearly high-intensity warfare.

My question might be, how and when do we know we're in one?

Air Marshal Hillier focused in this presentation on hybrid war as already part of the shift from the land wars. And the hybrid concept really gets at what some called operating in the gray zone, but there is nothing gray about using high intensity warfare tools in operations short of open direct conflict.

The entire maneuvering among the allies and with the Russians prior to executing a very high intensity warfare strike on Syrian chemical facilities illustrates the challenge and the reality.

Hillier added:

"You asked me to speak about high-intensity warfare in Europe.

"Perhaps I've not really provided that much of that specific geographical context.

"But then as I said right at the start, I don't believe that what I've described can be bracketed within a particular geography.

"The challenges I've described are truly global and truly common to us all. I believe that airpower's inherent characteristics and capabilities make it especially able to respond effectively to those challenges."

https://sldinfo.com/2018/04/shaping-a-way-ahead-the-perspective-of-air-chief-marshal-stephen-john-hillier-the-royal-air-force/

The nature of the strategic change facing the liberal democracies has been highlighted by the Finns with the establishment of a hybrid influence center to look at the core challenges in the expanded areas between war and peace generated by the approaches of the Russians and other authoritarian powers.

In a 2018 visit to Helsinki to the Centre of Excellence for Countering Hybrid Threats, we discussed what they see as the shifting approach.

According to Juha Mustonen, Director of International Relations, at the Centre: "Adversaries are using many instruments of power. One may identify a demonstration affect from the limited use of military power and then by demonstrating our vulnerabilities a trial of a psychological affect within Western societies to shape policies more favorable to their interests."

"If you are using many instruments of power, below the threshold of warfare, their synergetic effect can cause your bigger gain in your target societies, and this is the dark side of comprehensive approach."

"The challenge is to understand the thresholds of influence and the approaches.

"What is legitimate and what is not?

"And how do we counter punch against the use of hybrid influencing by Non-Western adversaries?

"How can we prevent our adversaries from exploiting democratic fractures and vulnerabilities, to enhance their own power positions?

"How do we do so without losing our credibility as governments in front of our own people?"

https://sldinfo.com/2018/03/the-standup-of-the-centre-of-excellence-for-countering-hybrid-threats-shaping-a-way-ahead/

The work of the Centre is posing some key questions associated with the strategic shift:

How do we work deterrence in this realm?

How do we fight in the hybrid warfare and hybrid influence space?

And how do those adaptations relate to the evolution of our general force structures, and approach to warfare?

Crafting an Effective Deterrence Equation

Defense.info

High intensity warfare at the highest end is total war. It is about a test of wills and capabilities at the society level. The engagements in the past two decades of counter-insurgency and stability operations have not been that. As one Marine put it a few years ago: "The Marines are at war; Americans are the shopping mall."

Obviously, high intensity operations which break out from constrained engagements, such as was just seen in the Syrian strikes in April 2018 and escalate to tests of warfighting systems at a macro level is one meaning of the shift from the counter insurgency operations to high intensity conflict.

If there is a significant spin out into more extensive military operations where tests of entire warfighting systems can be envisaged, it is crucial for the Western democracies to have effective alliance support structures not only in place but effectively so.

The alliance factor is crucial to how liberal democracies can prepare for high-intensity war. It is also a problem or challenge which needs to be managed, for allies are different nations, different cultures, different leadership structures, this creates seams which can be exploited, and adversaries are focused on how to divide and conquer.

Managing effective alliance working relationships in the presence of significant domestic changes within liberal democracies and while adversaries are operating WITHIN those societies is no simple matter.

It is not at all clear that the inherited alliance practices developed over the past twenty years will be able sustain the effective alliance political and military relationships necessary to deter adversaries from driving wedges between allies to enhance their own power positions.

Dramatic Change in the Force Structures

The Western allies engaged in a very significant shift away from forces designed for their direct defense to expeditionary forces able to operate at much greater distances and engage in counter insurgency warfare.

The US led invasion of Iraq and the endless war in Afghanistan drove fundamental change on US and allied forces. Domestic defense structures deigned in the time of the Cold War to defend key European states, were dismantled. West Germany was a well-fortified and defended states; the new Germany is not.

Defense infrastructure has been significantly dismantled in Europe, and the preparation for dealing with the shock of adversary military operations virtually non-existent. During the Cold War, NATO exercised WINTEX exercises whereby civilian leaders working with the military prepared for military crisis and potential nuclear war.

This generation of political leaders would not even now what you are talking about if you mentioned WINTEX.

Re-focusing on direct dense in Europe will not be about rebuilding Cold War defense structures. The societies that existed at the time simply no longer exist. And the past twenty years of military reform has meant that both the US and its allies have fundamentally altered their military structures as well.

Instead of fortified capabilities, especially important now as the Russians have built up their missile strike capabilities, lighter forces have been built. And these forces move to conflict areas using Fed-Ex like force capabilities rather than forces designed to operate in contested air and sea space.

Moving from a force designed to operate without being challenged by air and naval power to one able to operate and prevail against such assets is at heart the strategic shift for the forces.

How will the West carry out such a transition?

What will the NATO structure actually look like given that not all states are going to do a strategic transition in force structure?

And how will NATO and other allies train to the new period of history?

Clearly since, 2014, NATO has begun to change and to consider new ways of operating. The US military has certainly refocused on training and exercises to operate in a contested environment and has been a key participant working with NATO allies in reshifting the focus, but this is clearly a work in progress.

And time is not necessarily on the side of the US and its allies in facing the probability of peer-to-peer conflict nor effective adaptations to the kind of conflict which the head of the RAF described in his comments last year.

How can the West steer an effective way ahead?

And to do so in a timely manner?

PART II: THE CRISIS MANAGEMENT FOCUS AND CHALLENGE

The strategic shift from the land wars to what has been called great power competition or conflict with peer competitors is not about the return of the Cold War.

The Russians are back; but not the Cold War. And we have the rise of an innovative authoritarian global state, China, which is evolving innovative ways to compete with the liberal democracies.

What this means is that shaping forces which will succeed in prevailing in crisis management are not the legacy force packages of the Cold War.

What is necessary is proactive crisis management.

How do we know what the adversary is preparing?

How do we have the SA and understanding to prepare?

And what kind of force packages do we tailor to have the effect we want without over-escalating?

What analysts have referred to as the Chinese operating in the gray zone or the Russians practicing hybrid war are part of the reconfiguration of the challenge of crisis management.

In a recent book edited by Andres S. Erickson and Ryan D. Martinson entitled China's Maritime Gray Zone Operations, there is some good throughout about how to conceptualize operations short of all-out war.

In effect, what the authors have done – without themselves having recognized it – is to lay out ways to think about the range of operations which shape a crisis. And by so doing, they have raised the question of how to manage such a spectrum of options?

We have reviewed the basic book recently, and that review can be found here:

https://defense.info/book-review/2019/03/chinas-maritime-gray-zone-operations/

We raised some key questions in the review:

The challenge can be put bluntly — deterrence has been designed on the Western side with large scale engagement of enemy forces in mind.

Defense.info

What if deterrence in this sense is the necessary but not sufficient capability to constrain the actions of the authoritarians?

What if you can deter from full scale war, but by so doing not be able to control what your adversary is doing in terms of expanding his global reach and reshaping the strategic environment to his benefit?

What if you have organized yourself for deterrence but not effective crisis management?

Before focusing on how to think about proactive crisis management and tailoring force packages for crisis management itself, I would like to look at how the authors conceptualize the gray zone and hybrid warfare as stages of conflict.

The book defines gray zone activities "as competitive interactions that fall between the traditional dualities of war and peace."

This makes sense up to a point unless of course the dualities of war and peace themselves are not dualities in a 21st crisis management dynamic for liberal democracies dealing with 21st century authoritarian states.

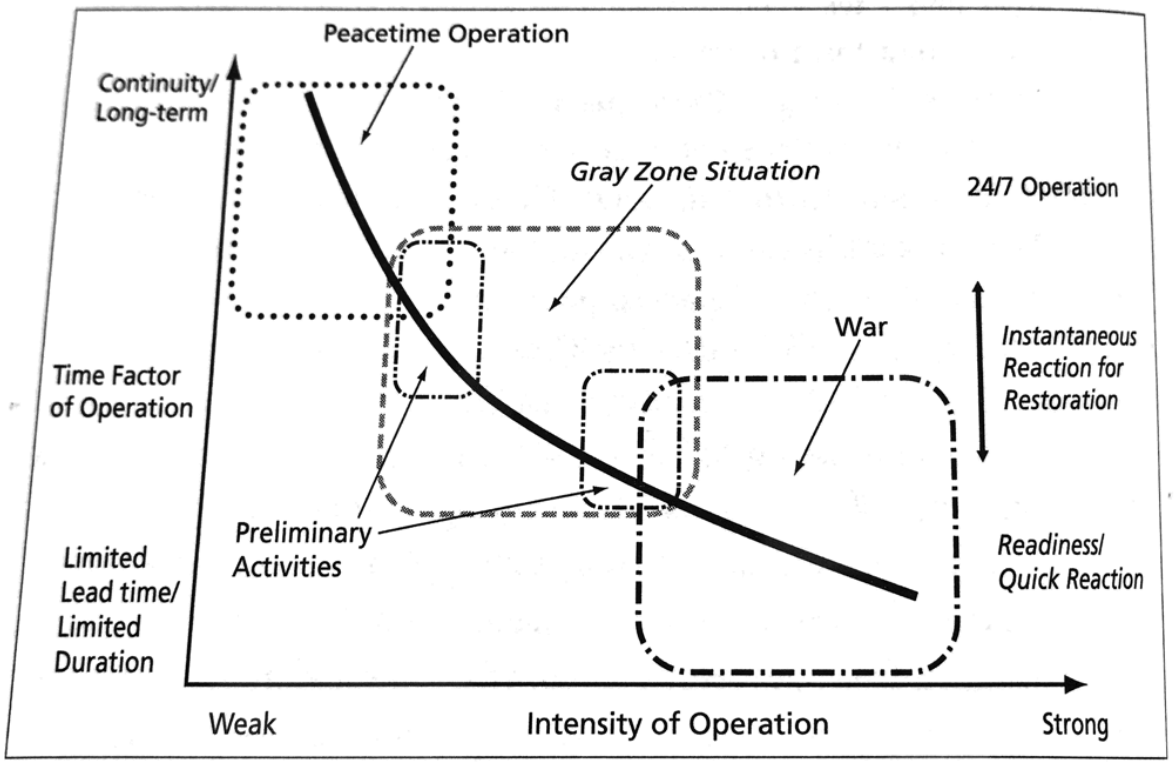
The authors argue that the purpose of gray zone activities is "to achieve specific strategic advantages or revise the international status quo without resorting to outright conflict. Gray zone campaigns are, of course, not new in history, but they are becoming more common as globalization and military technology raise the cost of direct aggression to exorbitant levels and as nonlethal tools such as cyber weapons and advanced information campaigns create greater opportunities to achieve national strategic objectives at lower geopolitical cost." (pages 16-17).

They add: "gray zone competition is aggressive and coercive, but it also calculated to avoid crossing red lines and to remain below deterrence thresholds."

In a chapter in the book by a Japanese author, the range of conflict inclusive of gray zone activity is conceptualized.

The graphic below conceptualizes the author's approach.

Exhibit 14-1. Time Factor and Intensity of Maritime Security Operations



The author explains the graphic as follows:

The horizontal line = intensity of operations

"Intensity is a function of the tactics employed."

The vertical line = the time factor or continuity of operations.

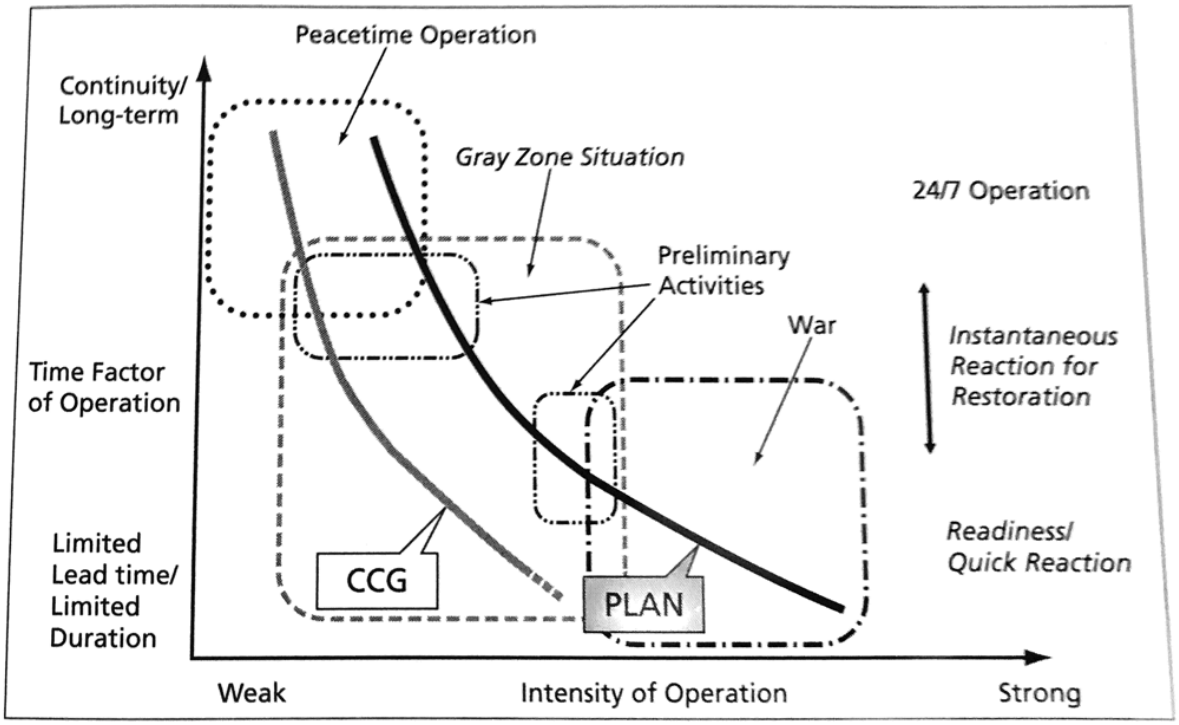
"Long operations are at the top and short operations are at the bottom."

If one applies this graphic to crisis management, the core point is both how long the crisis unfolds and with what means, and what tools would either led to resolution or to escalation.

As applied to Chinese maritime operations, the author applied his graphic in terms of the role of the white hulls (Coast Guard) versus the gray hulls (or the combat ships). In other words, the notion of gray hull involvement would bring greater lethality to the operation, although with the evolution of modern task forces, one would not need to bring a ship to the fight, one could use airpower, for example.

Defense.info

Exhibit 14-2. Possibility of White Hull and Gray Hull Gap



In the conclusion to the book, they argued for a US gray zone operational response but because they focused on the US Navy the USCG or the USAF or the USMC are not to be found.

Exhibit C-1. "Definitive" U.S. Actions to Help Allies Assert Their Maritime Rights

Maritime Rights of Allies	"Definitive" U.S. Action
Sovereign access to their offshore rocks and reefs	Escort allies' vessels; if necessary, use nonlethal means to protect them
Sovereignty to fish within their own waters	Escort allies' vessels; if necessary, use nonlethal means to protect them
Sovereignty to explore and exploit seabed resources in their own waters	Escort allies' vessels; if necessary, use nonlethal means to protect them
Sovereignty to prevent poaching within their own waters	Help allies arrest and charge Chinese poachers; protect allies' constabulary vessels from Chinese harassment
Sovereign right to prevent foreign theft of their seabed resources	Help allies board Chinese ships and charge Chinese companies for operating illegally in allies' waters; protect allies' constabulary vessels from Chinese harassment
Sovereignty to conduct military exercises in their own waters	Conduct joint exercises with allies in their waters

And this is a major gap in the analysis which gets directly at crisis management and responses.

If we now think more broadly about crisis management, several things can be noted.

First, you have to understand the nature of an intervention and what chain of events that might trigger.

So you need to shape actual crisis management knowledge.

Second, you would have to have relevant situational awareness about what you are looking at, namely, what is the nature of the intervention?

Third, one would need to correlate SA with relevant tailored force packages that could address the intervention and provide a checkmate but also be in ready alert with an escalation capability which would itself allow for better management of the crisis.

In effect, one needs to develop tailored and linked force capabilities which can see, act and effectively contribute to management of the situation.

With legacy forces – that those inherited from the Cold War and modernized in the land wars – you need to bring a relatively large force package to any crisis.

This might actually be counterproductive. You also have to think sequentially in terms of ever cascading levels of force and numbers of platforms to be committed to the crisis.

Sequential force escalation is inherent in the legacy force packages for this is largely the only way to show up in strength and make what you hope is your point.

Defense.info

But one can think about this approach very differently with a kill web capable force or a fifth generation enabled force.

The old system of sequential air operations built around legacy aircraft, AWACS, and multiple assets needs to be replaced in a timely manner by a well-resourced distributed operations enterprise.

The sequence would be something like this:

Shaping civilian understanding of the range of options being pursued by the new authoritarian peer competitors. This would be an evolving work in progress. This is not the classic intelligence gathering process; this would be about shaping and understanding evolving templates of operations by the competitor.

SA would be deployed in ways that could provide proactive information which could then be correlated with the templates of understanding what the adversary might do.

Presence packages would be shaped to move into the area of interest; notably using tip of the presence/sword assets like the F-35 would be crucial to move into an operational area.

These presence packages need to be rapidly deployable, small to be sustainable and scalable.

Such an approach requires significant change.

First, the civilian side of defense would need to recognize that the Russians are back not the Cold War. This is not the past; it is a new future whereby the way the US has built and deployed force simply does not fit what the adversaries are doing.

Second, this requires multi-domain SA – this is not about the intelligence community running its precious space-based assets and hoarding material. This is about looking for the coming confrontation which could trigger a crisis and the SA capabilities airborne, at sea and on the ground would provide the most usable SA monitoring. This is not "actionable intelligence." This is about shaping force domain knowledge about anticipation of events.

Third, this requires tailored force packaging and take advantage of what the new equipment such as the F-35 provide in terms of multi-domain delivery by a small force rather than a large air-sea enterprise which can only fully function if unleashed in sequential waves.

This really is what the fifth-generation revolution is all about.

It is not about a new airplane or a new fleet of airplanes; it is about dealing with the approaches of the 21st century authoritarian peer competitors on their own ground and constraining, containing and rolling them back.

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

PART III: CRAFTING AN INTEGRATED FORCE FOR CRISIS MANAGEMENT THROUGH THE SPECTRUM OF CONFLICT

As the strategic shift from the land wars gains momentum the investments and training in an appropriate 21st century crisis management and high intensity combat force will not be modelled on the Cold War European based force. It is not about a German-US Army brotherhood with significant presence. It is not about re-establishing air-land battle

It is about leveraging core force integration capabilities, such as F-35 with the Aegis, which can provide a pull function moving the US and the allies towards a more flexible and scalable force which can operate over the spectrum of operations.

As Vice Admiral Barrett, the former Chief of the Australian Navy highlighted with regard to how he saw the build out of the Australian Navy: "We are not building an interoperable Navy; we are contributing to an integrated Australian Defence Force able to exercise sovereign options and work closely with core allies."

Because the adversaries are building to mass and are emphasizing expansion of strike capabilities controlled by a very hierarchical command structure, the kind of force which will best fit Western interests and capabilities is clearly a. distributed one. Fortunately, the technology is already here to build effectively down this path, a path which allows engagement at the low end and provides building blocks to higher end capabilities.

The force we need to build will have five key interactives capabilities:

1. Enough platforms with allied and US forces in mind to provide significant presence;
2. A capability to maximize economy of force with that presence;
3. Scalability whereby the presence force can reach back if necessary at the speed of light and receive combat reinforcements;
4. Be able to tap into variable lethality capabilities appropriate to the mission or the threat in order to exercise dominance.
5. And to have the situational awareness relevant to proactive crisis management at the point of interest and an ability to link the fluidity of local knowledge to appropriate tactical and strategic decisions.

To be blunt about the last point – a cutting edge new system, the Triton UAV, is part of the new maritime SA force for the US and selected allies. The SA on this aircraft needs to be used by the presence forces and not be part of the "intelligence collection" team back in the United States. Or put in other words, the new challenges require a significant challenge in terms of how the very un-agile US intelligence process tries to "own" information.

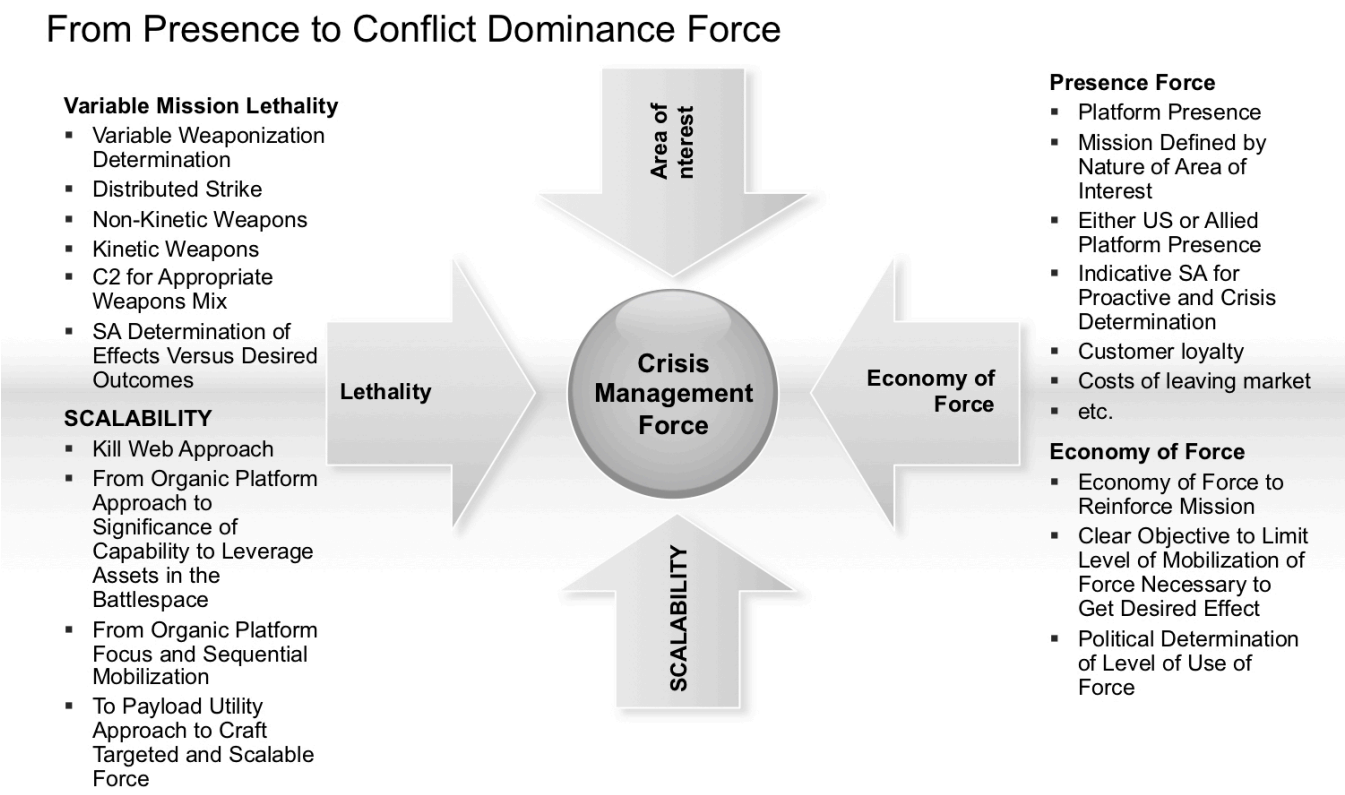


FIGURE 1 GRAPHIC BY SECOND LINE OF DEFENSE

The new approach is one which can be expressed in terms of a kill web, that is a US and allied force so scalable that if an ally goes on a presence mission and is threatened by a ramp up of force from a Russia or China, that that presence force can reach back to relevant allies as well as their own force structure.

The inherent advantage for the US and its allies is the capability to shape a more integrated force which can leverage one another in a crisis.

A good example has been the evolution of the Aegis fleet in the Pacific.

The enhanced capability of the US and allied navies is coming not just from platforms but from kill web integration.

There is no greater case in point than how the US Navy and the allies are integrating their Aegis destroyers.

Earlier, this year, the Australian Navy demonstrated its ability to integrate with the US Navy with regard to the CEC system.

According to Andrew McLaughlin in an article published on January 7, 2019:

The tests were conducted in conjunction with the US Navy at the vast Pacific test ranges near Hawaii and off the coast of California, and saw the vessel's systems and crew challenged in realistic tests and demonstrations. This included testing the vessel's ability to integrate with US Navy assets via the Co-Operative Engagement Capability (CEC), a US high-end naval networking capability so far made only available to Australia.

"We were presented with some of the world's toughest and most challenging threats; modern anti-ship missiles, maritime strike aircraft, fighters and high-speed attack craft," Commanding Officer of HMAS Hobart, CAPT John Stavridis told Navy Today. "On every occasion we successfully defended all threats."

Part of HMAS Hobart's systems validation included a series of at sea tests known as Combat System Ship Qualification Trials (CSSQT) which aim to achieve a sustainable level of combat and weapon system readiness.

"This ship represents the future of the Royal Australian Navy's surface combatants: capable, competent and lethal," Fleet Commander, RADM Jonathan Mead said upon HMAS Hobart's return to Sydney. "With her recently commissioned sister ship, HMAS Brisbane, and soon to be delivered NUSHIP Sydney they will be able to defend our Fleet against any threat."

As part of the increasingly integrated maritime threesome — the US, Australian and Japanese Navies — the Japanese recently added a new platform to the mix.

According to Naval Today:

Japan's second Asahi-class destroyer, the JS Shiranui, entered Japan Maritime Self Defense Force (JMSDF) service in a ceremony at Mitsubishi Heavy Industries' Nagasaki Shipyard on February 27.

The lead ship in the class was commissioned a year before, on March 8, 2018.

The 5,100-ton general-purpose escort destroyers were previously designated as 25DD and are designed on the basis of Akizuki-class destroyers but with a focus on anti-submarine instead of anti-air warfare.

JS Shiranui (DD-120) was launched in October 2017 and was commissioned without delays.

Asahi-class destroyers are lauded as fuel-efficient ships featuring COGLAG, a combined gas turbine engine and electric propulsion system. They measure 151 meters in length and reach speeds of 30 knots, according to the Japan defense ministry. Armament includes Mark 41 vertical launch systems for self-protection, 62-caliber naval guns, close-in weapon systems and two Mark 32 surface vessel torpedo tubes.

The destroyers will have a complement of around 230 and embark one Mitsubishi-built SH-60J/K are anti-submarine patrol helicopter.

Asahi-class destroyers are the first JMSDF ships to deploy with periscope detection radars in addition to being equipped with new towed array sonars.

Earlier, when the first of the new destroyers was launched from its shipyard last year, the integration piece was highlighted.

Japan launches first 27DDG-class AEGIS destroyer from a shipyard in Yokohama today (July 31). She has named "Maya" after mountain in Japan and WWII heavy cruiser.

Defense.info

The US$1.5 billion vessel is the seventh Aegis destroyer acquired by Japan Maritime Self-Defense Force, but the first to be fitted with the advanced Cooperative Engagement Capability (CEC) system. With a displacement of 8,200 tons and a length of 170 meters, it is scheduled to enter service by 2020.

Supplied by the US, the CEC system enables real-time sharing of intelligence on battlefield situations and hostile targets between ships in allied navies, while information and parameters are synced across all platforms linked to a sensory network. Sharing of radar and fire-controlling data will also be possible with the US Navy.

Warships equipped with this system can intercept incoming ballistic missiles in steep, lofted trajectories, and track dozens of targets simultaneously while firing clusters of defensive missiles, according to Japan Times. One such missile is the SM-3 Block IIA.

Japan will have eight Aegis destroyers with a ballistic missile defense capability by 2021. At their core will be a computer-based command-and-decision element capable of mounting simultaneous operations against a range of threats.

Because all three of these navies are part of the F-35 global enterprise as well, integration of F-35s with Aegis is part of the combat capability facing adversaries in the Pacific.

A shift to a kill web approach to force building, training and operations is a foundation from which the US and its allies can best leverage the force we have and the upgrade paths to follow. A kill web linked force allows a modest force package – economy of force – to reach back to other combat assets to provide for enhanced options in a crisis or to ramp up the level of conflict if that is being dictated by the situation.

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-domain 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-domain 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 cannot 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 a grid that can operate in an area as a seamless whole, able to strike or defend simultaneously. This is why Wynne has underscored since at least 2005 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 tron warfare 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.

The US Navy leadership has coined their version of this approach, the "kill web." In an interview we did with Rear Admiral Admiral Manazir, then head of N-98, Naval Aviation.

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

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

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

As such, C2 is ubiquitous across the kill web.

Where is information being processed?

Where is knowledge being gained?

Where is the human in the loop?

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

The key task is to create decision superiority.

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

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

We are creating a force for distributed fleet operations.

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

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

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

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

https://sldinfo.com/2016/10/the-deputy-chief-of-naval-operations-for-warfare-systems-look-at-the-way-ahead-rear-admiral-manazir-on-shaping-kill-webs/

Defense.info

Inherent in such an enterprise is scalability and reach-back. By deploying the tron warfare grid or a C2/Information superiority "honeycomb", the shooters in the enterprise can reach back to each other to enable the entire grid of operation, for either defense or offense.

By being able to plug into the F-35 and Aegis enabled honeycomb, the United States provides force augmentation and surge capability to those allies and at the same time those allies enable forward deployments which the United States would not own or operate.

Put in other terms, presence is augmented at the same time as scalability is as well. This provides a significant force multiplier across the crisis management spectrum.

In effect, what could be established from the United States perspective is a plug-in approach rather than a push approach to projecting power. The allies are always forward deployed; the United States does not to attempt to replicate what those allies need to do in their own defense.

But what the United States can offer is strategic depth to those allies. At the same time if interoperability and interactive sustainability are recognized as a strategic objective of the first order, then the United States can shape a more realistic approach than one which now rests on trying to proliferate power projection platforms, when neither the money nor the numbers are there.

Put bluntly, if you do not get, you do not get it. The fifth generation enabled force is here; and the challenge is clearly to leverage it as one builds out new elements of the kill web to enhance the scope and lethality of the US and allied force structure in either the Pacific or Europe.

PART IV: THE F-35 AND ITS CONTRIBUTION: THE GLOBAL ENTERPRISE AND THE KILL WEB APPROACH

In many ways, the F-35, notably as a global enterprise, is at the epicenter of kill web development. In this section of the report, we will discuss the intersection of what the F-35 brings to the fight and how it provides an ability to shape the force structure we argued is necessary for a sliding capability to provide for crisis management solutions.

We have written earlier reports which discuss the capabilities inherent in the F-35 as a flying combat system, and those reports provide in detail what those capabilities are and how they are synergized through data fusion in the combat systems.

In an article we first wrote for the Joint Forces Quarterly, we highlighted ways in which the F-35 contributes to force transformation.

In that piece entitled "The F-35 and the Future of Power Projection," we argued:

At the heart of the F-35 is a new comprehensive combat systems enterprise.[8] *The F-35 is the first combat aircraft that sees completely around itself. The Electro Optical Distributed Aperture System (DAS) makes this happen, and it allows the opera- tor or the fleet managers to see hundreds of miles away on a 360-degree basis.*

The combat system enterprise allows the aircraft to manage the battlespace within this seam- less 360-degree space. Unlike legacy aircraft, which add systems that have to be managed by the pilot, the F-35 creates a synergy workspace where the core combat systems work interactively to create functional outcomes; for example, jamming can be performed by the overall systems, not just by a dedicated electronic warfare system.

The F-35 is a flying combat system integrator and in a different historical epoch than the F-15s, F-18s, and F-16s. The 360-degree capability, coupled with the combat system enterprise, explains these historic differences on a per plane basis.

The ability of the new aircraft to shape distributed air operations collectively is another historic change that the United States and its allies need to make, especially with the growing missile, air defense, and offensive air capabilities in the global market space and battlespace. The legacy combat aircraft have added new combat sub-systems over a 30-year period. These evolved aircraft and their new subsystems are additive, iterative, and sequential. The resulting configurations are built over the core foundational

The F-35 was built with a foundation that allows interactivity across the combat systems, permitting the forging of a combat system enterprise managed by the computer on the aircraft. Said another way, F-35 core combat systems are interactive with one another, creating a synergistic outcome and capability rather than providing an additive- segmented tool. The aircraft's systems are built on a physical link, namely, a high- speed data bus built on high-speed fiber optical systems…

Connected to the other combat systems via the high-speed data bus is the CNI system (communications, navigation and identification). This is a flexible radio frequency system that enables the aircraft to operate against a variety of threats.

The other core combat systems, which interact to create the combat systems enterprise, are the Active Electronically Scanned Array (AESA) radar, DAS, Electrical Optical Targeting System (EOTS), and electronic warfare (EW) system.

https://ndupress.ndu.edu/Portals/68/Documents/jfq/jfq-66/jfq-66_85-93_Laird-Timperlake.pdf?ver=2017-12-06-115714-667

(Also, see the following: https://sldinfo.com/2016/10/an-overview-on-the-f-35-as-a-flying-combat-system/).

Based on the inherent capabilities built into the aircraft and upgradeable over time through block software upgrades, F-35s can operate as a completely integrated force package and operate in the area of interest by working together seamlessly in monitoring the area of interest. And can operate against threats in the area of interest directly with its own kinetic and non-kinetic warfighting systems or offload a data link to another asset in the battlespace to execute the strike mission.

Based on these combat capabilities, the F-35 provides a foundation for empowering the kill web. We have argued above that such an approach is central to how the US and allies will need to operate against peer competitors; we are simply arguing that the F-35 has come at the right time and the right place to facilitate the combat transition necessary to operate against 21st century threats and peer competitors.

We of course, are NOT arguing that the F-35 even as a global enterprise will do this by itself but as the epicenter of a broader set of transformations in which the sensor-shooter relationship is reworked into distributed operational capabilities.

It is coming into service as the US and its allies are facing a key strategic shift from conflict with non-peer competitors in the context of counter-terrorism efforts to one in which engagement with peer competitors and crisis management involving high-end warfare assets are involved.

This means that as the F-35 is being introduced, infrastructure built, training worked, and software upgrades processing evolving capabilities, the forces operating the new aircraft are doing so with a clear focus on leveraging the aircraft for multi-domain warfare.

Defense.info

It is not a multi-mission asset; it is a multi-domain warfare platform.

How best to leverage the new platform?

How-to set-in motion changes in other platforms which can generate a fifth-generation combat force?

The F-35 as an enabler of transformation and as part of transformation is triggering the kind of force structure we have argued earlier is critical to operate against 21st century peer competitors who operate from gray areas and with hybrid warfare means, as well as shaping larger force structures for their deterrent affect against the US and the allies.

(See the report on F-35 2.0 which looks at the broader transformation process:

https://sldinfo.com/2018/09/f-35-2-o-introducing-the-concept/

The C2 Piece

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.

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.

https://sldinfo.com/2016/02/looking-back-remembering-desert-storm-and-looking-forward-to-the-renorming-of-airpower/

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.

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.

The F-22 and even more than the F-22, the F-35, are multi-tasking aircraft not simply multi-mission aircraft which can be directed to the mission.

Put in other words, 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 legacy CAOCs is asymmetrical with the trend of technology associated with fifth generation warfare.

As Robert Evans, a former USAF pilot, and now with Cubic Corporation put the change in an interview while he was with Northrop Grumman:

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.

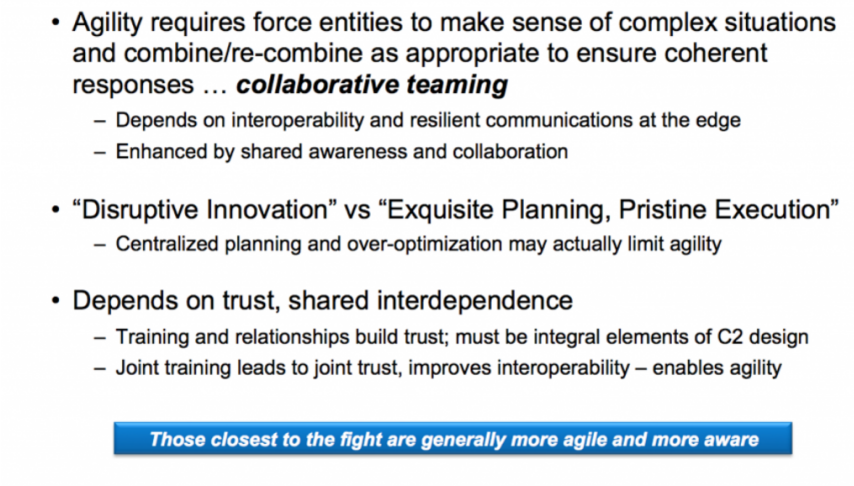


FIGURE 2 SLIDE BY ROBERT EVANS

The Economy of Force Piece

With what a four-ship formation of F-35s can bring to an operation – with their ability to cover an area of interest with significant sensing capability – as well as operate in a flexible mission command approach, economy of force is clearly facilitated.

Rather than having to bring an AWACS, an EW platform, and other assets to an area of interest, the four-ship formation operating with a significant fuel load can operate in an area for a significant period of time. It can reach back to tankers for more extended operations and within the span of an operational day can provide initial presence or reachback reinforcement to a presence force.

Economy of force is built into the F-35 as an operational asset. But because of the F-35 global enterprise, the reach of the system is significant. If a US or allied ship is operating in an area of interest and has a pop up "gray zone" threat seeking to intimate with close in combat assets, the US or allied ship can receive escalatory assistance by either US or allied F-35s coming to the fight in a two or four ship formation.

Economy of force allows for expanding the tools in a crisis management situation without having to unleash a large legacy air operation – this allows both for a show of relevant force as well as limiting the scale in terms of numbers of assets. All of this is very useful, if one is focusing on crisis management, rather bringing a larger sequentially enhanced force to the fight.

Because of the global nature of the F-35 enterprise, the US services and the allies are operating the aircraft worldwide. With F-35s operating throughout the Pacific, in Europe, in the Middle East and aboard US and allied ships, the F-35s can work together cross service and cross nationally to deliver trusted information to inform combat operations. This means that from an economy of force approach, a US presence force can be reinforced by allied F-35s and vice versa.

Because of the central significance of economy of force to get the desired combat effect is so central to 21st century crisis management with peer competitors, the F-35 global enterprise provides a very significant set of tools to the combat commander or the policy maker for escalation or de-escalation and not having to mobilize a larger than necessary force to the mission.

It is hard to underestimate the importance of not needing to launch an escalatory larger scale than needed mobilization effect to get the outcome you want in a crisis.

As General Hostage, then the ACC Commander, put it into an interview with Laird and Lt. General (Retired) Deptula in 2013 in his office at Langley AFB:

The F-22s aggregated in appropriate numbers can do some amazing and essential tasks, and with a significant number of F-35s, we can reshape the operational space.

The ability of the planes to work with each other over a secure distributed battlespace is the essential foundation from which the air combat cloud can be built.

And the advantage of the F-35 is the nature of the global fleet.

Allied F-35s and American F-35s, whether USAF, USN, or USMC, can talk with one another and set up the distributed operational system. Such a development can allow for significant innovation in shaping the air combat cloud for distributed operations in support of the Joint Force Commander.

https://sldinfo.com/2013/01/shaping-the-way-ahead-for-airpower-general-hostage-focuses-on-the-future/

In other words, the global fleet allows an economy of force deployment worldwide, given that either allied or US F-35s can either spearhead and operation or provide escalatory support.

The multi-mission capabilities of the aircraft mean that a small footprint can bring diversified lethality to the fight. An F-35 squadron can carry inherent within it an electronic attack force, a missile defense tracking capability, a mapping capability for the ground forces, ISR and C2 capabilities for the deployed force and do so in a compact deployment package.

In addition, an F-35 fleet can empower Air Defense Artillery (ADA), whether Aegis afloat or Patriots and THAAD Batteries, the concept of establishing air dominance is moving in a synergistic direction. An F-35 EW capability along with its AA and AG capability will introduce innovate tactics in the SEAD mission.

Concurrently, the F-35 will empower U.S. and Allied ADA situational awareness. The current engagement of the IDF employment of their Irion Dome in conjunction with aviation attacks is a demonstration of this type of emerging partnership being forged in battle.

To get a similar capability today into the Area of Interest would require a diversified and complex aerial fleet, whose very size would create a political statement, which one might really not want to make.

With an F-35 enabled ground insertion force, a smaller force with significant lethality and flexibility could be deployed until it is no longer needed for it is about air-enabled ground forces. A tiltrotor enabled assault force which the Marines have operated for more than a decade and now with its top cover from a 360-degree operational F-35 fleet, whether USMC, USN, USAF or allied can allow for the kind of flexibility necessary for 21st century warfare and operational realities with an economy of force level of effort.

What Economy of Force Can Provide for a Crisis: What if the F-35 was in Play During the Malaysian Airliner Shootdown in Ukraine?

The past decade's experience of the need to shape a very large and expensive ground grid from which to feed Special Forces and ground operations is not one the US is going to repeat anytime soon.

At the same time, conflict is evolving as well.

The evolving pattern of 21st century conflict is emerging.

Defense.info

It is a pattern in which state and non-state actors are working to reshape the global order in their favor by generating conflicts against the interests of the democracies but which the democracies are slow to react.

The assumption of Putin's Russian Ukrainian adventure and the Chinese leadership relying in part on the PLA to expand the domain of Chinese sovereignty in the South China Sea is that the slow decision-making cycles of democracies can be exploited to make gains.

And gains can be achieved on a piecemeal basis, rather than going for the big grab which can provide a dramatic event usable by democratic leaders to mobilize public opinion and generate resources to respond.

A mix of non-kinetic, kinetic and information warfare elements are blended into an assertive adversary political-military policy against democratic interests.

A good example is the approach of Putin's Russia in the Ukraine.

The actions in Ukraine have included seizure of territory, the use of Special Forces, information war, the use of indigenous Russian armed and trained "separatists," and other techniques.

Vladimir Putin was a young KGB Officer who was active when President Reagan won the IW against the Soviet Union trying to stop the US and NATO successfully placing tactical nuclear cruise missiles in Europe as a major deterrence move.

In the Euromissile Crisis he learned how not to lose an Information War. Consequently, he is shaping a 21st century blend of combining military moves with successful propaganda.

The shoot down of the Malaysian airliner by Russian "separatists" and the absence of any Western response to secure the site and work with the Ukrainians to bring the separatist operation to a halt was a key element of his successful strategy.

The US and NATO lost a significant opportunity to do a very good thing in protecting the victims' bodies and rolling back literally drunken separatists that could have been achieved by the President of Ukraine calling in an insertion force of MV-22 enabled Marines.

Sadly, an opportunity was missed, the US could have responded to the Malaysian shoot down in Ukraine by working with the Ukrainian government to bring in forces to secure the crash site.

If this was the pre-Osprey era, an insertion might be more difficult, but with the tiltrotor assault force the USMC can be put in place rapidly to cordon off the area. Had this occurred it would have signaled a credible global response to the disinformation campaign of Russia and its state-sponsored separatists.

Airpower dominance over Ukraine coupled with the Marines on the ground, and forces loyal to Kiev could have secured the crash site without becoming a permanent US military base. It is about using flexible military insertion forces in ways appropriate to the political mission.

Now fast forward to the F-35 global enterprise and consider what two key stakeholders in responding the shootdown could do with their F-35s in the picture.

The Australians and the Dutch had citizens murdered in the downing of the airliner and both states worked closely together to coordinate a response. In an interview with former Chief of the ADF, Air Marshal Binsken recently in Canberra he highlighted how for the ADF became involved in the response. The Australian PM meeting with the Dutch PM decided to forge a coordinated response.

https://www.theguardian.com/world/2018/may/25/mh17-australia-and-netherlands-accuse-russia-of-complicity

The ADF sent a C-17 to recover the bodies of the Australian victims and worked with the US and the Netherlands in the recovery effort

But now as F-35 partners, and if such a situation happened again, now the two states have new options.

With the US, the two partners could decide to hold the Russians accountable. Marines would be flown to the area where the aircraft had been downed and secure the area for international authorities to come to the crash site and verify what happened. The Marines could. Be flown in with Osprey or Ks to the area of interest with F-35s flying cap to the mission.

Now the Aussies could fly a four ship F-35 force to Europe and could operate with a similar Dutch force and be maintained in the Netherlands if they so choose. But the Aussies could fly to Europe to have the aircraft maintained during the mission without having to fly their support force to the area of interest.

That Dutch-Aussie F-35 force could work seamlessly with the Marines and now you have moved from a symbolic protest to a proportionate force able to defend your interests in the crisis. This proportionate force would be built from an economy of force orientation and the Russians would have little to complain legitimately about.

Such a force would not be threatening Russian borders but would be capable enough to defend themselves against any Russian forces – regular or irregular – who might choose to get involved in the Western verification mission.

In other words, instead of doing nothing or needing to bring a much larger force to get a desired outcome, a tailored force to a humanitarian mission but one with investigatory bite could now deployed to such a crisis.

This is a new capability and one very relevant to the evolving 21st century crisis management context.

The Scalability Piece: Kill Webs and Reshaping Presence

In our book *on Rebuilding American Military Power in the Pacific* published in 2013, we highlighted throughout the book the key importance of scalability for a US and allied force to operate from a variety of locations on land, sea and air but to be able to aggregate relevant force upon an area of interest. This is really what scalability is all about,

But to be able to do so requires trusted communications and information and C2 for a distributed force which allows a commander to all upon dispersed platforms that can be tailored to the mission.

This is what a kill web delivers. We referred to it in the book as the ability to shape a honeycomb force, but with the US Navy officially adopting the kill web concept we prefer now to use that term to describe how kill webs enable both economy of force as well as scalability.

We warned in our book that analysts were persisting in granting to our adversaries a power to innovate in their combat force but not giving full credit to the approach the US and the allies are themselves leveraging new platforms, notably the F-35, to innovate in a way designed to support our way of war and our way of life.

Too often analysts forget that as competitors like China innovate, so does the United States and its allies. Of course, another way to address this is to complicate dramatically the PRC's ability to operate against the

United States and its allies operating a distributed force operating as a honeycomb. Such a force is built around presence, is scalable and is connected with other force elements to give it significant reachback. As part of deterrence or war fighting, the United States can reshape the expectations of where its forces can operate or how the United States can reshape its force packages on the fly.

(Laird, Robbin. Rebuilding American Military Power in the Pacific: A 21st-Century Strategy: A 21st-Century Strategy (Praeger Security International) (p. 48). ABC-CLIO. Kindle Edition.).

We then addressed in the third part of the book the broader questions of how to think about scalability as a key warfighting enabler. If you replace the term honeycomb with kill web that would accurately express our thinking. We had done an interview with the then head of N-98 who is now the Vice Chief of Naval Operations, Admiral Moran, and introduced the concept of the "spider's web" as a way to discuss how the new carrier would be able to operate in the transition to a maritime force in the throes of transformation along the lines of distributed lethality.

https://breakingdefense.com/2013/05/navy-the-f-35c-the-ford-class-carrier-spider-web-war-at-sea/

"Scalability is the crucial glue to make a honeycomb force possible, and that is why we see a USN-USMC-USAF common fleet as a crucial glue. And when "Aegis becomes my wingman" or when "the SSGN becomes the ARG fire support" through the F-35 C5ISR D systems, a combat and cultural revolution is both possible and necessary.

We added as well that "Basing becomes transformed as allied and U.S. capabilities become blended into a scalable presence and engagement capability. Presence is rooted in basing; scalability is inherently doable because of C5ISR enablement, deployed decision making, and honeycomb robustness."

(Laird, Robbin. Rebuilding American Military Power in the Pacific: A 21st-Century Strategy: A 21st-Century Strategy (Praeger Security International) (pp. 211-212). ABC-CLIO. Kindle Edition).

We then coined the phrase that with a kill web, "no platform fights alone."

'No platform; no presence; no capability to play a role protecting your interests. No platform fights alone, and a core aspect of the new distributed approach is how the USCG, USN, and USMC forward deployed can work with others and become fully networked with its C5ISR D capabilities to work in a crisis situation with local forces."

(Laird, Robbin. Rebuilding American Military Power in the Pacific: A 21st-Century Strategy: A 21st-Century Strategy (Praeger Security International) (p. 218). ABC-CLIO. Kindle Edition).

We focused in our book on what we saw as the building blocks for the new strategy which we now call the kill web.

The section of the book which we published in 2013 with regard to building blocks is clearly coming to fruition and we will discuss three key elements of the approach which are being implemented or scoped out for implementation seven years later, namely the new amphibious strike group; the reworking of sustainment and working through ways to do what we would call sustained engagement by the US and allies on one another's territory, whether on land or at sea; and reworking basing.

What follows to complete this section is what we wrote in 2012 about the building blocks for s scalable force.

We will then address each of the three key elements mentioned above in the next three sections.

There are a number of key technologies being rolled out in the decade ahead that can enable such an approach.

First, there is the F-35 itself, in all three variants. The F-35 brings to the Pacific a networked fleet of strikes and defense assets. These aircraft will operate with significant reach via their communications systems, which are built around a multifunction advanced data link, and their extended 360-degree situational awareness.

In effect this fleet will create a set of strike-and-defense aircraft able to see hundreds of miles ahead of themselves and able to build a Pacific network for operations. This capability is inherent in the aircraft with its revolutionary cockpit. The F-35 brings to the Pacific significant interoperability among the U.S. and allied fleets.

This is built out from the common cockpit to embrace shared approaches to sharing data and sharing concepts of operations.

The fleet of F-35s can be based across a wide range of operational venues. F-35As bought by allies and the United States alike will be deployed across a wide range of Pacific air force bases. F-35Cs will operate off of large-deck carriers. And the most innovative of the F-35s, from a basing standpoint, the F-35B, will provide significant deployment flexibility.

And this flexibility could well provide an inherent deterrent capability because of the significant uncertainty it provides for an adversary seeking to destroy fixed airfields or strike a significant base like Guam.

The entire approach of the F-35 enables the sustainment of the fleet in radically different ways from the past. And it is coming at a time when economic pressures create such a need; but if new approaches are not taken, money will be invested in maintaining less effective forces.

First, at the heart of the new approach is an inherent capability to leverage logistics hubs throughout the Pacific to create a seamless ability to sustain both allied and American planes. Presence from this perspective has a whole different meaning. Hub sustainment means that the United States can surge aircraft to the region and be supported during surge operations without having to carry its sustainment capability forward with the surged aircraft, which is the requirement currently.

The opportunity and ability to build hubs and training ranges in the Pacific with potential hubs and ranges in Canada and Australia and hubs in Japan, South Korea, Singapore, Alaska, Hawaii, and Guam provides an opportunity to reshape how sustainment can be done around the world. Indeed, it is the fleet approach to the F-35 that will be a central foundational element for shaping the new big blue blanket for the 21st century.

Second, there are new ships upon which these aircraft will operate. The Ford class carriers are designed for upgradeability in terms of power, communications, and eventual form, fit, and function of weapons systems—some found today only in labs and test ranges. The America class LHDs are designed to carry a new generation of aircraft, which are inherently upgradeable. The America class ships are virtually the same size as the Charles De Gaulle class carriers.

Third, there will be harvesting of the impact of the transformational Osprey upon maritime operations. The range and speed of the Osprey along with various other capabilities such as self-deployment will allow the USMC-USN team to operate with much greater flexibility.

Fourth, there will be an evolution of the seabase, which will allow the USN-USMC team to creatively explore ways to shape expeditionary expeditionary strike groups and not be caught in the grip of traditional ARG-MEU or carrier battle group concepts.

Defense.info

For example, in the Bold Alligator 2012 and 2013 exercises, the USN-USMC team has already demonstrated the transformation of the GATOR navy from operating like a Greyhound bus to laying the foundation to be a much more flexible expeditionary strike force.

Fifth, new weapons will be introduced that will reshape capabilities. No weapon will be more transformational than the hypersonic cruise missile. As Dr. Mark Lewis, the leading American expert on hypersonics has argued, hypersonic cruise missiles are on the horizon and provide a response to the tyranny of distance:

One option for the evolution of warfare is that you get to where you want to go as fast as you possibly can. That's the advantage of hypersonics. This could be to perform reconnaissance of some sort, do some sensing, or to deliver weapons on a target. In order to do that, we need to master the technology required to fly at hypersonic speeds.

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

A key challenge will be to defend against these missiles as well as to shape a CONOPS to use them. Sixth, the weapons revolution will be facilitated as well by the "off-loading" dynamic associated with the introduction of larger numbers of fifth-generation aircraft.

With sensors being deployed on manned and unmanned systems, the strike element can be organic or offloaded to other platforms. Leveraging the connectivity across the scalable force means that designing new weapons for the subsurface as well as surface force makes sense.

One can focus on building weapons that are cost effective to the support mission. Rather than using expensive Tomahawks for the strike mission, weapons designers can now look at what to insert into the subsurface fleet or put aboard the surface fleet that fit a broader range of needs at a more effective price point. By shaping a new weapons enterprise that can enable the scalable force rather than being platform centric, weapons planners can shape in effect next-generation capabilities.

Seventh, the unmanned revolution will accelerate if able to operate within a "Tron" warfare environment. The ability to operate what General Hostage calls the "combat cloud" will require successful execution of what one might call Tron warfare. Electronic warfare is evolving to become a much broader concept, embracing cyber defensive and offensive operations as well or what we are calling Tron warfare. Part of the formation of a successful operation of the wolfpack will be testing in exercises such as Northern Edge where flying systems are put their paces in terms of engaging in electronic and eventually Tron warfare.

This is an environment in which the fifth-generation aircraft are optimized and in which unmanned systems will have to survive trial by fire.

Remotely piloted aircraft or RPAs (commonly and mistakenly called unmanned aircraft) will be an important part of the evolving wolfpack CONOPS of air operations over areas of interest if we are able to surmount the Tron warfare barrier.

The F-22s and F-35s can work interactively with RPAs to establish a new concept of operations to leverage and control deployed assets to shape effective strike and reconnaissance operations in areas of interest. But the unmanned revolution will not be confined to the air. It will be on the sea and under the sea. Take the case of countermining.

With new robotic underwater and surface vehicles, the role of identification and eventually destruction of sea mines can be envisaged. And these systems can be married to many different types of air and sea platforms.

These are just some of the technologies already being introduced and likely to be deployed that can reshape concepts of operations to allow for a distributed force operating within the "single naval battle" or shaping an "air-sea" battle capability…..

Laird, Robbin. Rebuilding American Military Power in the Pacific: A 21st-Century Strategy: A 21st-Century Strategy (Praeger Security International) (pp. 222-225). ABC-CLIO. Kindle Edition.

Presence, Economy of Force and Scalability: The New Amphibious Task Force

The USMC is considered the nation's crisis management force.

But with the rise of new authoritarian powers, peer-to-peer maneuvering and conflict are now a clear part of crisis management.

The good news is that the evolution of the USN-USMC team at sea has evolved over the past decade, and now the amphibious task force piece of crisis management is a key element bringing presence, economy of force, scalability and lethality to the operational force.

Prior to the coming of the Osprey, the amphibious force was operating within a 200 square mile box. The Amphibious Ready Group-Marine Expeditionary Unit could engage in the high-end fight only with the presence of the carrier task force or USAF support.

This all changed with the Osprey.

Now the Marines could operate at much greater distance and the ARG-MEU evolved to operate over a much wider area.

Within the first decade of the change, the three ship ARG-MEU began to be part of different land-based operations, and the C2 side of the operation became a bit confused and muddled from the standpoint of the amphibious task force itself.

With the coming of the F-35B to the amphibious force, now the crisis management force had a high-end asset able to provide tip of the spear ISR, C2 and weapons to the fight.

We have seen this with the first deployed F-35B enabled amphibious task force which has just returned from the Middle East this year.

The deployment marked the first combat sorties by the F-35B multi-mission jet, flown by the Wake Island Avengers of Marine Fighter Attack Squadron (VMFA) 211 from Marine Corps Air Station Yuma, Ariz. Missions included support to ground forces in Iraq, Syria and Afghanistan.

The amphibious force operated in three geographic regions during the deployment, mostly in the U.S. 7th Fleet and 5th Fleet – and Anchorage also traveled to the Mediterranean to support U.S. 6th Fleet operations and train with the Italian military.

"The 13th MEU provided support to Operation Inherent Resolve and Operation Freedom's Sentinel while simultaneously supporting maritime security and theater security cooperation events in the U.S. 5th Fleet and 6th

Defense.info

Fleet areas of operations," Col. Chandler Nelms, the 13th MEU commander, said in a news release. "Our dynamic operations demonstrated the flexibility of the amphibious task force….."

The F-35B squadron is part of the 13th MEU's air combat element led by Marine Medium Tiltrotor Squadron 166 (Reinforced).

The 3rd Battalion, 1st Marines led the Battalion Landing Team 3/1 as the MEU's ground combat element, and Combat Logistics Battalion 13 served as its logistics element. The Essex ARG includes includes the Blackjacks of Helicopter Sea Combat Squadron 21 and detachments from Assault Craft Unit 5, Naval Beach Group 1, Beachmaster Unit 1, Fleet Surgical Team 3 and Tactical Air Control Squadron 11….

The following is the March 1, 2019 release from U.S. 3rd Fleet.

Essex Amphibious Ready Group Returns from Deployment

By Third Fleet Public Affairs

SAN DIEGO (NNS) — Sailors and Marines of the Essex (LHD 2) Amphibious Ready Group (ARG) returned to their homeport of San Diego, following a successful deployment to the Indo-Pacific, Middle East, Mediterranean, and Horn of Africa regions, March 1.

More than 4,500 sailors and Marines of the Essex ARG and embarked 13th Marine Expeditionary Unit (MEU) conducted maritime security operations and theater security cooperation efforts in support of regional security, stability, and the free flow of maritime commerce.

"This deployment was a great example of dynamic force employment," said Capt. Gerald Olin, commander, Amphibious Squadron (PHIBRON) 1. "We were successful on our deployment because we operated the way we trained. Our team was manned, trained and equipped successfully so that we were able to meet mission requirements in every fleet."

During the ARG/MEU's deployment, the ships conducted subject matter exchanges and important theater security cooperation exercises with regional partners in 5th, 6th and 7th fleets as well as participated in military operations.

"Our dynamic Blue-Green team performed admirably and their accomplishments speak wonders to the resolve, resiliency and incredible sacrifice the Sailors, Marines, and their families made to make this a successful deployment," said Olin. "I am proud to have been part of this deployment with this team, and after such a successful deployment, I know our Sailors and Marines, as well as their friends and families, are excited to be home."

Essex is comprised of amphibious assault ship USS Essex (LHD 2), amphibious transport dock USS Anchorage (LPD 23), and amphibious dock landing ship USS Rushmore (LSD 47). Embarked commands include "Blackjacks" of Helicopter Sea Combat Squadron (HSC-21), Assault Craft Unit 5, Naval Beach Group 1, Beachmaster Unit 1, Fleet Surgical Team 3, and Tactical Air Control Squadron 11.

13th MEU is commanded by Col. Chandler Nelms and consists of the Command Element, the Aviation Combat Element comprised of Marine Medium Tiltrotor Squadron 166 (Reinforced), Marine Fighter Attack Squadron 211, the Ground Combat Element comprised of Battalion Landing Team 3/1 (Reinforced), and the Logistics Combat Element comprised of Combat Logistics Battalion 13.

The end of this deployment is uniquely significant, as it was the inaugural combat deployment of the Marine Corps F-35B Lightning II.

"The Essex was embarked with the next generation of air assets," said Olin. "The full integration of the Marine Corps F-35B Lightning II drastically enhanced the ARG/MEU lethality and proved to be a credible strike and defense capability. The MV-22 provided the range and cargo capacity to maintain critical logistical lines of effort to maintain continued support of operations. This Essex deployment perfectly demonstrated the promising future of aviation for the ARG/MEU teams."

Throughout deployment, the ARG/MEU participated in a variety of exercises with multi-national partners throughout the Indo-Pacific, Mediterranean, and Middle East regions, which strengthened partnerships and increased combat readiness, amphibious and crisis-response capabilities, and communication between U.S. and partner nation forces.

In the western Pacific, sailors and Marines worked with militaries during bilateral Cooperation Afloat Readiness and Training exercises with Malaysia and Indonesia. Simultaneously, sailors and Marines of the Anchorage worked with the military of Sri Lanka to bolster regional partnerships.

In the Middle East, the team participated in exercises with a variety of partners during bilateral engagements such as Eastern Maverick 19 with Qatar and the Theater Amphibious Combat Rehearsal, which was conducted in Djibouti.

"Our Sailors and Marines did an absolutely fantastic job this deployment," said Capt. Brian Mutty, commanding officer of Essex. "It was impressive to watch the Navy/Marine Corps teams execute every mission we were tasked with. During Theater Amphibious Combat Rehearsal and Eastern Maverick, the coordination between the Navy-Marine Corps team effectively projected power from the sea and ashore. Furthermore, the ship provided direct combat support for Operations Inherent Resolve and Freedom's Sentinel."

As Rushmore and Essex conducted operations in the Middle East, Anchorage represented the ARG/MEU team as they operated in the Mediterranean Sea. The steadfast and formidable presence of Anchorage and the 13th MEU decisively advanced stability and security objectives in the region.

"Our ARG/MEU team operated across two geographic combatant commands simultaneously supporting multiple operations, exercises and subject matter expert exchanges," said Capt. Dennis Jacko, commanding officer of Anchorage. "The inherent flexibility of the ARG/MEU is what makes our team so valuable to theater commanders, and the robust capability of the LPD 17 Class to execute independent operations provides a force multiplier in every ARG."

https://news.usni.org/2019/02/28/13th-meu-essex-arg-return-home-ending-first-f-35b-combat-deployment

The new capabilities of the new amphibious group were demonstrated during this deployment as well.

In an article by Alex Lockie published on September 11, 2018, the role of the amphibious task force off of Syria was highlighted and the force would not be playing this role without the F-35B onboard.

A U.S. Marine Corps aircraft carrier full of F-35B stealth jets showed up in the Middle East after Russia threatened U.S. forces in Syria in the latest military buildup between the world's two greatest nuclear powers.

Russia sailed a small armada to the Mediterranean sea in August as its prepares with its ally, Syria, an offensive against the last rebel stronghold in the country after predicting a chemical weapons attack that it prematurely blamed on U.S.-aligned forces.

Defense.info

Until recently, the U.S. had no capital ships and just one or two destroyers in the Mediterranean, but the USS Essex, a small, flat-deck aircraft carrier used to launch U.S. Marine Corps F-35B stealth jets that can take off almost vertically, just arrived off the horn of Africa, USNI News reports.

Though the Essex remains on the opposite side of the Suez Canal from Russia's ships in the Mediterranean, it's a quick-moving ship. Additionally, the F-35Bs can fly about 550 miles out from the ship in stealth configurations that make them hard to detect for enemy defenses.

Direct combat between Russia and the U.S. remains unlikely, as both sides work together to avoid accidental conflict and neither side seems willing to escalate a fight over Syria into a massive war.

But Syria has hosted the world's liveliest air defense and battlespace for years. Missile fires have taken down Israeli, Syrian, and Russian jets over the course of the war. Syria has seen the combat debut of the F-35 and the first U.S. air-to-air kill between manned aircraft since 1999.

The F-35Bs aboard the Essex will train on a variety of missions near the Red Sea, such as how to provide close air support for Marine units optimized to take beaches, or how to respond to an attack.

"Our primary mission is crisis response… being current and absolutely ready for anything the geographic combatant commander needs us to do while we are here," Col. Chandler Nelms, commander of the military expeditionary unit aboard the Essex told USNI.

Gidget Fuentes in an article published on February 27, 2019 by USNI News highlighted the new roles for the amphibious task force which the deployment is presaging.

The Marine Corps is slowly replacing its aging fleet of AV-8B Harrier attack aircraft with the fifth-generation fighter that boasts suites of advanced avionics, navigation, communications and weapons systems that added a wide range of new capabilities to the Essex ARG.

"It's got the short-takeoff capability of the Harrier, the speed and payload of a (F/A-18) Hornet, and it's got the forcible entry options that stealth technologies give us," Nelms said.

"Because of its air-to-air capability and its sensors for air-to-ground capabilities, it also provides a new dynamic for the ARG commander, for the commodore, while we're out conducting blue-water operations or littoral operations or defending the ARG. … On its first deployment, it was kept very busy."

"[It] increases battlespace awareness with data fusion and the ability to share information with the ships and the ships' combat control system," Capt. Gerald Olin, Amphibious Squadron 1 commander and Essex ARG/MEU commodore, told USNI News from Essex. "So it's really an extension of our sensors, and it also brings to the table a greater increased lethality than what we had with previous generation aircraft…"

The aircraft and its integration with the ship and integration with the mission exceed my expectations," Lt. Col. Kyle Shoop, who commands VMFA-211, told USNI News. "Just in our time with 5th Fleet, we supported over 50 days of combat for over 1,200 flight hours … didn't drop a single line of FRAG or combat support."

At times, the jets flew off Essex for long missions, "and we kept employing ordnance in both theaters," Shoop said, referring to Afghanistan for Operation Freedom Sentinel and Syria and Iraq for Operation Inherent Resolve.

"The jet itself proved to be very reliable. Throughout that whole time period, Marines did a great job keeping it serviceable," he said. "We were gone away from the ship for an extreme amount of time – a lot of times over

five, six hours away from the ship – and they'd turn them around that night to fly again the next day. So that went really well."

The F-35B performed "like we expected," Shoop added. "Some of the sensors onboard would do better than, say, a Harrier would through adverse weather or things like that. So, it proved to be pretty versatile…"

The addition of the F-35B also gave commanders an aircraft capable of helping defend the amphibious task force. Its onboard systems provided a data link so "we could communicate with and incorporate into our defensive posture," said Olin, whose career includes operational deployments with carrier strike groups.

"That's kind of the model I'm used to. We were able to emulate that, to some extent, here on the Essex ARG by using the F-35 for deck-launched interceptor support, defensive counter-air, anti-surface warfare type of missions. So that was a really great addition to the package here, above what we and I had experienced with the AV-8 Harrier on the last deployment."

"I think we have already proven that the [F-35B] is reliable and that it integrates well on the amphibious shipping," Nelms said. "So, the next step now is just continue to develop the tactics, the techniques, the procedures of how we fight with that. We got a really good look at that on this deployment, and I think there's a lot more to be explored in the future."

The articles cited above discuss the recently returned ARG-MEU force which deployed with the F-35 for the first time.

It is clear that the multi-domain aircraft is at the heart of changing the ARG-MEU for a launch point for helo or Osprey enabled forces and providing a high-end capability integrated into the insertion force.

But we have argued for many years, the F-35 is an enabler but you will not get full value from the aircraft, not the global fleet unless you change the entire approach and put into operation new technologies and capabilities which enabled what we initially called the honeycomb force and what we know use, the more widely used term, the kill web.

For the ARG-MEU what this has meant that a significant cluster of innovations is changing the nature of it's capabilities and making a key element for crisis management against peer authoritarian powers.

First has been the maturation of the Osprey.

Second has been building a new class of amphibious ships which can make significantly greater advantage of Marine Aviation as the enabler for the assault or insertion force.

The USS America is a whole new class of ships which has three decks and an ability to support aviation in a way that the two deck large deck amphibs simply cannot.

Third has been the significant emphasis of the Marines on shaping a digital interoperable force, one which can reshape the nature of distributed operations.

Fourth has been the sun-setting of the Prowler EW aircraft and focusing on tron warfare built into the operational force.

Fifth has been adding new ships to the task force, some from the Military Sealift Command and working through ways to add capabilities to the task force as a crisis unfolds.

Defense.info

Sixth is training for operating in contested environments and dealing with degraded C2 and here the F-35 can provide key capabilities as a crisis might evolve.

Seventh is the ability to put the new G/ATOR system ashore which can provide the ashore insertion force with significant new reachback capabilities or scalability.

Eighth is the ability to work interoperability between the F-35 and land and sea missile defense systems.

Integration with Aegis provides a significant and rapid asset which can affect the battlespace rapidly.

(Not to put fine a point on this, we already anticipated this in 2011 when this article was written:

https://www.usni.org/magazines/proceedings/2012/january/long-reach-aegis)

And with the Marines latest artillery pieces being linked ashore or afloat, the Marines are working towards what they see as a more integrated kill web farce.

Again, one that can provide presence as the task force enters an area of interest but one which has the capability to add task force elements from ground, sea or air elements within connectivity reach.

Ninth the coming additions to Marine Corps Aviation are conceived of in terms of adding new capabilities to a kill-web enabled amphibious task force.

The new CH-53k is not an E; it has combat systems onboard which change the nature of what a heavy lift helicopter can bring to the fight and can deal with contingencies requiring an augmented ground maneuver force.

Tenth any new unmanned system to be added to the force is seen to contribute to the kill web evolution and if it becomes more a speed bump rather than a contributor, then the Marines will wait until they get the kind of unmanned systems they are looking for.

(See the chapter by Robbin Laird on the USMC in the new book, One Nation Under Drones.)

Eleventh the force can operate and be sustained from the seabase.

This means that mobile basing is inherent to the force, something which the F-35B can do ashore or afloat.

This means as well as directed energy weapons enter the force, they can be placed on the asset most ready to support it, namely a ship with enough power to operate these systems.

In short, the F-35B has been an enabler of a significant change to the amphibious task force.

But its full value will become expanded or realized only as the task force itself evolves.

With the significant evolution of the amphibious task force into one which can provide presence, economy of force and scalability through the kill web to other Army, Navy or Air Force assets or through the F-35 global fleet through rapid allied augmentations, the USN-USMC team is at the heart of reshaping the kind of crisis management capability crucial to deal with the authoritarian peer competitors we are now confronting globally.

Sustained Engagement: The US and the Allies Work Cross-Supportability Strategies

At the heart of the challenge of rebuilding an effective force package to deal with peer competitors is the underlying need to build a 21stcentury infrastructure capability to support military operations in a contested environment.

With the focus on the Middle East, logistical systems in the United States, in the West and in the Pacific were lightly protected and operated through either using commercial systems or systems which operated similar to Fed Ex.

When dealing with a peer competitor, one can expect those systems to be targeted early on.

The challenge then is to build hardened shelters, active defense and to find ways to stockpile the parts, and repair capabilities, which can allow US and allied forces to sustain an ops tempo which allows us to prevail in a significant crisis.

The German Case

A recent trip to Germany highlighted how difficult the rebuild process will be.

The Germans are projected by NATO to be the logistical hub for NATO in the support of operations to the new members of NATO to the East. Germany is where forces will move through and forward to support combat or deterrent operations against the Russians.

But according to several retired senior Bundeswehr officers with whom I spoke during my February 2019 visit, the German military simply has no such hardened supply capabilities today.

A good example of the thinking is the support center for the Eurofighter in Munich. The center is above ground, and a centralized support facility.

There is no active defense; there is no bunkering of parts or anything remotely connected to the needs of a strategic shift.

Obviously, the Germans are not alone and there is the broader question of the significant rebuild in European infrastructure, which is necessary to prepare for sustained operations in the face of Russian aggression.

Shaping a New Approach

It was very clear from discussions during visits to Finland, Norway and Denmark this past year that the return of direct defense is not really about a return to the Cold War and the Soviet-Western conflict.

Direct defense has changed as the tools available to the Russians have changed, notably with an ability to leverage cyber tools to leverage Western digital society. and, more generally, to be able to achieve military and political objectives with means other than direct use of lethal force.

This is why the West needs to shape new approaches and evolve thinking about crisis management in the digital age.

It means that NATO countries need to work as hard at infrastructure defense in the digital age as they have been working on counter-terrorism since September 11th.

The Finnish Case

There is little doubt that the Finns provide significant domain expertise into how to operate a force under duress from the Russians.

Defense.info

They have some significant history on their side and during a visit last year to Finland, discussions with Finnish officials about the central importance of hardened facilitates and the need to operate a distributed force while under the threat or under actual attack.

For example, Jukka Juuisti, Permanent Secretary in the Finnish Ministry of Defence underscored:

"If you look at the map of Finland, it's not an island but in practice we are an island.

"The vast majority of our trade is coming by ships.

"In that sense we are an island and this means that we have taken the security of supply always very seriously.

"It is the nature of Finland that we believe that we have to be able to take care of some of the most vital things by ourselves.

"That's the reason for example that security of supply is so important for us.

"For example, with regard to ammunition and those kinds of supplies, we have a lot of stocks here in Finland.

"Of course, with regard to some of the equipment we never can have enough in our own resources.

"The security of supply has got another respect also, which is the civilian side of the aspect.

"We have a security of supply agency, which is extremely important for us and it takes care of the civilian part of the security of supply.

"For example, electricity and telecommunications are vital for the survival of the nation, and one needs have to have the security of supply in those areas. Security of supply agency collects the money in such a way that they are financially safeguarded.

"Whenever we buy some gasoline, they collect some part of that purchase for the security of supply funds.

"It is organized in that way.

"We are continuously investing, in effect, in security of supply for the civilian sector."

"And we think broadly about civilian defense as part of our mobilization strategy.

"That's the reason we were still building shelters for the civilians, both to maintain infrastructure in times of crisis and for civilian protection as well."

Shaping a Way Ahead

New paradigms, new tools, new training and new thinking is required to shape various ways ahead to shape a more robust infrastructure notably in a digital age.

Article III within the NATO treaty underscores the importance of each state focusing resources on the defense of its nation.

In the world we are facing now, this may well mean much more attention to security of supply chains, robust infrastructure defense and taking a hard look at the vulnerabilities which globalization has introduced within NATO nations.

Put in other terms, robustness in infrastructure can provide a key element of defense in dealing with 21st century adversaries, as important as the buildup of kinetic capabilities.

The return of direct defense but with the challenge of shaping more robust national and coalition infrastructure also means that the classic distinction between counter-value and counter-force targeting is changing.

Eroding infrastructure with non-lethal means is as much counter-force as it is counter-value.

We need to find new vocabulary as well to describe the various routes to enhanced direct defense for core NATO nations.

The F-35 Opportunity

There is no one path to solving the challenge of a 21stcentury robust infrastructure and sustainment set of capabilities.

But given the commitment of several key allies to the F-35, the emerging F-35 global enterprise does provide an opportunity to shape a new approach.

First, there is the various national approaches which key nations can take.

For example, at Orland Air Base, the Norwegians are building a hardened air base to support F-35 operations.

Force protection is a key part of building out the base, and, indeed, the center of excellence both for ground-based air defense, force protection and mobile logistic support operates currently from the base.

Second, cross learning among the European Air Forces in the UK, Denmark, the Netherlands, Norway, Belgium and Italy as well as US-facilities in Europe will allow the creation of effective templates for sustained operations and support necessary for the F-35 to play its key role of providing the tip of the spear for deterrence operations.

Third, the inherent sustainment capabilities built into the F-35 as an air system could allow the US and the allies to shape a new approach to sustained engagement.

The common systems throughout the global fleet and the cross training and cross operations of the aircraft can allow stockpiling of common parts in allied locations closer to potential areas of interest than being warehoused in the United States or at fixed and well-known locations.

Allied maintainers certainly could work with US maintainers to cross maintain US and allied F-35s at an allied location.

This would dramatically change the ability of the US and allies to fly to an allied base or location and shape a strike or defense force which could make a decisive difference in a crisis.

And the Fed Ex model could be put to bed with the large number of airlifters and tankers needed to supply forward bases in a crises; in place of this, the US and allies could invest in advance in capabilities at a common allied location likely to be most relevant to a crisis situation.

For example, the Aussies are standing up a significant support structure in Australia for regional support.

As they do so, allies such as the US and Japan can shape an approach to what I would call sustained engagement.

Defense.info

With crises to come in which the F-35s will play a key role, the Australians can provide operating locations for allies, without having to base those allies on a long-term basis.

This allows Australia its sovereignty but also allows allies like the United States and Japan to gain operational depth which will be crucial for deterrence in the region.

Because they are flying virtually the same aircraft, stockpiling parts and leveraging an expanded sustainment base with the Australian maintainers leading the way for the USAF to move to a new approach to operations which does not require them to operate like Fed Ex flying in resources to then stand up support in a crisis.

The USAF or the Japanese could fly to Australia and be supported by Australian based supplies and maintainers supplemented by Japanese and US maintainers and could operate rapidly in a crisis, rather than engaging in a significant airlift and tanking support set of missions to stand up aircraft in Australia on a case by case basis.

It is not about just showing up; it is about being able to do sustained engagement with an agile expeditionary support structure to establish and operate from a solid operational footprint.

An allied approach towards sustained engagement when married with Aussie rethinking about how to use their geography as well as base mobility creativity would significantly enhance deterrence and operational flexibility in a crisis.

Fourth, realizing a capability for the US or another ally of a given country to fly in, operate, and be sustained through a significant ops cycle also allows for another key enabler for engaging in the kinds of operations facing the liberal democracies.

Shaping a Mobile Basing Capability for Crisis Management

Clearly, mobile basing is required to operate against peer competitors like Russia or China who have prioritized a missile strike force as a major part of their crisis dominance or shock and awe strategy against us.

The Finns have lived this already so there is no shock in a possible shock and awe strategy against them.

According to Lt. General Kim Jäämeri in an interview with him last year:

“It is becoming clear to our partners that you cannot run air operations in a legacy manner under the threat of missile barrages of long-range weapons.

“The legacy approach to operating from air bases just won’t work in these conditions.

“For many of our partners, this is a revelation; for us it has been a fact of life for a long time, and we have operated with this threat in the forefront of operations for a long time.”

The importance of shift to mobile basing will only happen if a shift from the legacy sustainment approach is realized.

The nature of this shift was highlighted during visits with the Marines at Yuma Marine Corps Air Station, in Australia and in the United Kingdom.

One aspect of the change which have been observed and discussed during visits to Finland, the United Kingdom, and Australia and to MCAS Yuma is the importance of being able to do mobile basing.

At the Williams Foundation Seminar in Canberra in March 2018, the 11th Air Force Commander, Lt. Gen. Kenneth Wilsbach, highlighted the nature of the challenge requiring the shift to mobile basing.

"From a USAF standpoint, we are organized for efficiency, and in the high intensity conflict that we might find ourselves in, in the Pacific, that efficiency might be actually our Achilles heel, because it requires us to put massive amounts of equipment on a few bases.

"Those bases, as we most know, are within the weapons engagement zone of potential adversaries," Wilsbach said.

"So, the United States Air Force, along with the Australian Air Force, has been working on a concept called Agile Combat Employment, which seeks to disperse the force, and make it difficult for the enemy to know where are you at, when are you going to be there, and how long are you are going to be there.

"We're at the very preliminary stages of being able to do this but the organization is part of the problem for us, because we are very used to, over the last several decades, of being in very large bases, very large organizations, and we stovepipe the various career fields, and one commander is not in charge of the force that you need to disperse.

"We're taking a look at this, of how we might reorganize, to be able to employ this concept in the Pacific, and other places."

And during a visit to Amberley Airbase just before the Williams Foundation seminar in March 2018, the Commander of the RAAF's Combat Support Group discussed the transition.

"We are having to reacquaint ourselves with some tasks and challenges which we parked to the side a bit while we were in the Middle East for so long.

"We did not have to worry so much about mobile basing to counter the principal threats in that theatre," Robinson said.

"The mindset is in transition now."

He underscored that this clearly is an army and air force challenge.

"We are good at supporting maneuver with our tactical transport aircraft and Australia's Army aviation capability, including the Tiger Reconnaissance Helicopter, but what we need to do is move to the next level of support to maneuver the most lethal part of our air power capability across a range of airfield options."

Core capabilities such as providing fuel for air systems when operationalized for a mobile air basing force on Australian territory are clearly different from supporting a fixed airbase.

For example, "expeditionary fuel capabilities are something that's very much on the forefront of my mind.

"Lean and agile support packages to operate expeditionary airfields are also key, so that we can offer the best possible maneuver options to the aviators without tying down strategic airlift."

Whether to pursue mobile basing or build greater depth in Australian territorial defense is one of the core choices facing Australia as it continues its force modernization.

Either they can emphasize going deeper into the air-maritime domain in the Pacific or significantly augment their mobile defense capabilities leveraging the vast Australian territory.

Defense.info

The role of active defenses working with airpower mobility would be a priority in this second case.

A visit last year to the United Kingdom reinforce this point.

As the UK works through its post-Brexit defense policy, the role of the Nordic countries looms as increasingly significant.

The new Queen Elizabeth carriers are clearly very relevant to Northern Tier Defense and Mediterranean operations.

As a senior UK official put it during my visit in May to Portsmouth:

"The carriers will be the most protected air base which we will have.

"And we can move that base globally to affect the area of interest important to us.

"For example, with regard to Northern Europe, we could range up and down the coastlines in the area and hold at risk adversary forces.

"I think we can send a powerful message to any adversary."

The UK is working closely with the US Marines who have mobile basing in their DNA.

In recent Marine training exercises, which they call WTIs, have clearly emphasized the concept of mobility and strike from mobile bases.

The F-35B was at the heart of this, but mobility also requires a focus on support, which is integrated to the point of operation, rather than focused on having a series of Walmarts and maintainers with accounts at a Walmart store.

In an interview last year with then head of MAWtS-1, Colonel Wellons, he highlighted the USMC approach.

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

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

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

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

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

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

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

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

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

https://sldinfo.com/2018/06/the-usmc-shapes-a-way-ahead-the-perspective-of-the-commanding-officer-of-mawts-1/

It is about reshaping logistics to enhance operations to the point of attack, and this will be a major challenge to how the US focuses on its support structure for F-35.

In short, the strategic shift to high-end warfighting will highlight core competencies and capabilities such as mobile basing.

The transition will not be easy, either for the warriors or the decision-makers in Washington or elsewhere.

But it will be facilitated by the ability of the F-35 global enterprise to deliver a regional integrated fleet on the part of the US services working with allies. It is about the reach of the integrated SA, and the ability of taking C2 enabled SA to support decisions in a pre-crisis or crisis management situation.

All ISR is not equal. ISR that can be acted upon rapidly and accurately is the coin of the realm for crisis management; and the F-35 fleet will be a key foundation for such a capability.

F-35s aircraft can come from a variety of seabases and airfields, and provide an integrated picture of the battlespace and provide both presence and SA with regard to a pre-crisis or crisis situation.

From this standpoint, the fleet provides a solid foundation for the reachback to non-organic systems of attack and defense not carried by the fleet itself, but oriented by the information and C2 systems airborne with the fleet.

The fleet can provide to presence, economy of force or scalability dependent upon the mission set or the nature of the crisis situation.

Brigadier General Novotny, now the 57th Wing Commander at Nellis AFB, when he was Col. Novotny and based at RAF Lakenheath highlighted the future is now approach coming with the F-35 fleet being stood up in Europe:

During a visit to RAF Lakenheath in 2016, we discussed with Col. Novotny, how synergy between the UK standup of the F-35 and the USAF standup at RAF Lakenheath would affect the operational and sustainable fleet of aircraft in Europe.

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

Colonel Novotny added that the two bases joined at the hip can provide a key strategic impact as well.

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

https://sldinfo.com/2017/05/allies-and-21st-century-weapons-systems-the-case-of-the-coming-of-the-f-35-to-europe/

Defense.info

PART V: WORKING THE KILL WEB PIECE FOR FORCE TAILORING AND ESCALATION DOMINANCE

A commander deploying a platform or a presence force in an area of interest, with the new capabilities to connect forces can shape a commander's intent for a distributed force to execute. Clearly, one needs SA at the point of defense or attack, and C2 which can calibrate the tailored force needed to reinforce the platform or task force in the area of interest.

Forward deployable SA and C2 in combination is a core, indeed the core capability, required for a kill web approach. This is why the F-35 is at the epicenter of a kill web approach. The aircraft and a squadron can carry with it secure ISR and C2 which can then shape information for the commander and policy makers which can, in turn inform, with regard to the nature of the physical threat and provide information with regard to an escalation calculus, for the policy maker, and the force which needs to be scaled and tailored for the commander.

The Kill Web and the Payload/Utility Calculus

Tailoring a force rests on being able to configure the force not in platform terms, but in terms of the payloads which can be delivered to the presence force. It is about what can be included in an operational force able to reinforce and augment the presence force. This approach has been characterized by Ed Temperate as the payload-utility calculus.

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

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

There is a very simple formula, better and better TA and TE =more effective employment of all payloads available to the battle commander. It is the process of understanding the huge complexities in such a simple formula that is the challenge.

Understanding the technology and human dynamic through an analytic filter of a Payload Utility function consisting of weapons (kinetic and TRON) and the dual components of Target Acquisition (TA) and Target Effectiveness (TE) effectiveness for a fighting force engaged in combat gets away from a linear approach to assembling an organic task force

Either in one platform, or melded into a unified fighting frocee to bring all different types of appropriate "weapons on" for combat engagement and dominance is a powerful concept.

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

What does weapon or system add to task force Payload/Utility?

How does this system help in TA or Target Acquisition?

How does this system help in TE or Target Engagement?

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

How is the TA, TE and Weapons (kinetic and Tron) organized for effective performance in the battlespace?

How to tailor the force and ensure effective escalation dominance in support of the presence force?

The F-35 as an Enabler

The F-35 is known as a 5th generation player in the state-of-the-art for both the Air-to-Air Fighter and Air-to-Air Attack combat roles. It also adds an "electronic" or "tron" warfare component to the fight.

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

EW was designed inherently into the F-35 airframe and Fusion Cockpit. EW can include offensive operations to identify an opponent's emissions in order to and fry spoof or jam their systems.

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

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

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

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

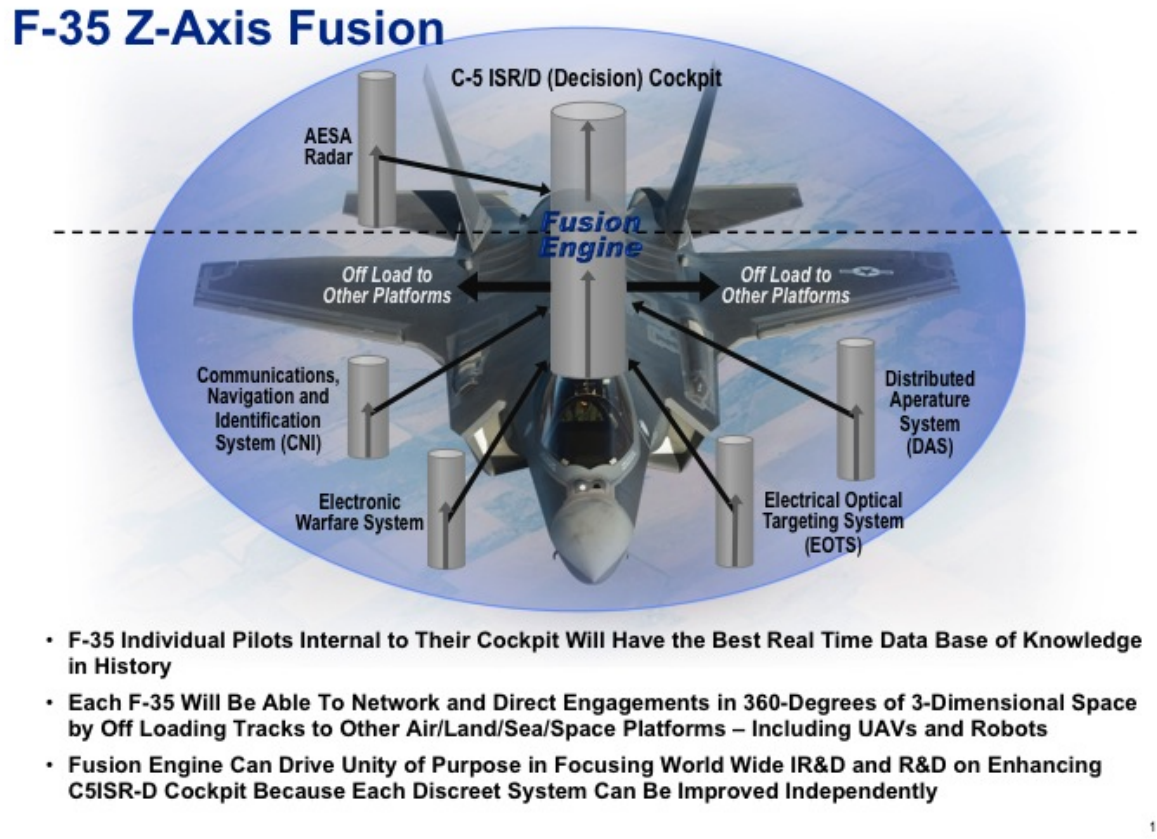


FIGURE 3 THE Z-AXIS CONCPET. CREDIT: SECOND LINE OF DEFENSE

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

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

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

That type of graph captures individual airplanes in generational shifts.

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

The aeronautical design "art" of blending together ever improving and evolving technology creates improvements in a linear fashion, if not performance would eventually go asymptotic.

The airframe design characteristics blended together prior to F-35 have been constantly improving range, payload (improved by system/and weapons carried), maneuverability (measured by P Sub s), speed, and range (modified by VSTOL–a basing mobility plus factor).

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

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

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

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

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

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

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

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

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

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

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

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

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

"With the F-35 I have organic EW capability.

"The EW capability works well in the aircraft.

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

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

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

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

Defense.info

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

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

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

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

This is the dawn of a new Payload-Utility paradigm not built around what a single platform can bring to the fight in terms of ITS payload, but the capability which can be mobilized against an adversary by a lead C2/ISR stealth asset.

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

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

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

Learning How to Forge and Execute a Kill Web

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

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

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

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

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

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

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

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

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

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

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

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

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

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

Only when we have learned how to design, execute and prevail in combat with kill webs will we really know what iis next in platform design; but as we add new payloads to the mix we will use those throughout the distributed operations space to learn what works most effectively for escalation control and crisis management dominance.

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

The Marines have been flying the F-35B for several years know with a pre-planned product improvement design philosophy.

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

This makes the case for understand better a Pu function beyond just ordinance carried on the organic platform itself.

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

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

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

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

Defense.info

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

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

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

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

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

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

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

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

Shaping a Force for Crisis Management and Escalation Dominance

To return to the earlier discussion in the report, we are focused on a tailored force that can provide for effective crisis management and for escalation dominance.

Because the adversaries are building to mass and are emphasizing expansion of strike capabilities controlled by a very hierarchical command structure, the kind of force which will best fit Western interests and capabilities is clearly a. distributed one.

Fortunately, the technology is already here to build effectively down this path, a path which allows engagement at the low end and provides building blocks to higher end capabilities.

The force we need to build will have five key interactives capabilities:

- Enough platforms with allied and US forces in mind to provide significant presence;
- A capability to maximize economy of force with that presence;
- Scalability whereby the presence force can reach back if necessary at the speed of light and receive combat reinforcements;
- Be able to tap into variable lethality capabilities appropriate to the mission or the threat in order to exercise dominance.
- And to have the situational awareness relevant to proactive crisis management at the point of interest and an ability to link the fluidity of local knowledge to appropriate tactical and strategic decisions.

To be blunt about the last point – a cutting edge new system, the Triton UAV, is part of the new maritime SA force for the US and selected allies. The SA on this aircraft needs to be used by the presence forces and not be part of the "intelligence collection" team back in the United States. Or put in other words, the new

challenges require a significant challenge in terms of how the very un-agile US intelligence process tries to "own" information.

If we consider the nature of the crisis management regime which is being shaped to deal with peer competitors, how to shape and operate a force which is agile enough to show up and powerful enough to see the crisis through to success, and ask how the F-35, notably as a global enterprise can enable, participate in, and trigger the kill web approach most suited to this challenge, how might we shape an answer?

The F-35, notably as a global fleet, can bring common systems and common training throughout the F-35 global enterprise. This means that the aircraft as it evolves its software can do so as a fleet, and the squadron pilots cross learn how to operate the fleet to enable and evolve the kill web distributed warfighting approach.

The presence force can be provided dependent on the mission by US or allied F-35s which can then link back to other capabilities for escalation capabilities and dominance. Or they in most conditions reinforce the presence force to provide for kinetic or non-kinetic capabilities but AT THE SAME TIME provide a gateway function for the force and for the task force commander. As local command or command at a higher level determines what additional capabilities need to be added to the force, the F-35 can provide ISR and C2 capabilities, to support the integration of incoming assets and capabilities.

It can function in this sense as a flow through capability from the presence force being augmented in a crisis to expand options for dealing with an adversary.

Because of the global enterprise, the presence force could be allied or American and can draw upon the much wider F-35 fleet operating world-wide.

But the global enterprise is a necessary but not sufficient condition for shaping the evolving kill web con-ops. As new capabilities, weapons, platforms, or ISR/C2 means are developed at the edge, the F-35 itself will evolve through its software systems.

It is a work in progress. Standing up F-35s in the various US services and F-35 partner nations is clearly underway. But that is the easy part; the real challenge is turning the F-35 into a global enterprise and one which can enable the kill web con-ops of distributed operations and scalable forces which can tailor force to a mission and to be able to be augmented through an escalation dominance process.

PART VI: THE CASE OF DEFEATING HYPERSONIC CRUISE MISSILES

Putin Works to Shape Escalation Dominance: Challenging the US Navy and the US Kill Web

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

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

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

Defense.info

In effect, what Putin did was to sound "General Quarters" for a combat proven warfighting Navy to go on high alert. The United States has now joined allies like Denmark which are the focus of the use of nuclear weapons threats as part of normal diplomacy.

But Putin has really picked the wrong adversary; one that can only shoot back with devastating results on Russia itself but operate in ways that can shred his own navy.

The greatest intangible strength of the US Sea Services is the fact that the diverse backgrounds of all Americans are forged together into a fighting Navy based on honor, and team play that has as it's very foundation the principle of always being a performance-based meritocracy.

The greatest tangible strength is that from the heavens to the deepest of the deep, the American Navy has world class state-of the art weapons and platforms integrated seamlessly into an evolving kill web, nuclear tipped.

No platform fights alone and the Navy always "trains trains trains" for evolving contingencies.

Refocusing on Core Threats

"Putin also announced the coming deployment of the new Zircon hypersonic missile for the Russian navy, saying it's capable of flying at nine times the speed of sound and will have a range of 1,000 kilometers (620 miles).

He said the Zircon program will not be too costly as the missile has been designed to equip Russia's existing surface ships and submarines."

"Potie Poot" as he was called by President Bush 43 or the man President Obama could do flexible business with after the 2012 Election has yet again miscalculated. Our President and the military will take his threats very seriously and act appropriately to show and not tell him that threatening United States with a sub launched nuclear strike is not a good plan.

The Cold War legacy to this day is that the number one event that can destroy America is a successful attack by an enemy that can launch a multiple nuclear warhead strike on the United State.

Everything else that currently takes probably 99% of our worries in print is second order.

This is not a bad thing because it reflects that our national command authority and Commander-in Chief are getting it right by refocusing our defense efforts on those peer competitors which seek to hurt us most.

Today a barrage fire targeting America with a massive strategic strike using nuclear warheads by Russia or China is still the ultimate strategic threat. The American military triad of ready launch missiles in silos, USN Boomers on station and strategic bombers comprise our strategic response force that is standing ever vigilant.

Deterring Russia and China with massive retaliation is the easiest theory to understand in this murky 21st Century "Second Nuclear Age".

In a seminal book Professor Paul Bracken of Yale University underscored the challenge of deterrence in the *Second Nuclear Age*:

What I wanted to do was to shift the debate.

There are many, many studies of books about deterrence, but deterrence really needs to be broken up into what I would call smaller chunks, which really gets into the subject of escalation and de-escalation.

I don't think it's possible to talk about deterrence and not talk about escalation and de-escalatio[2]

In his book, he argued that mastering the maneuver space for the threat to use nuclear weapons was part of escalation dominance which leaders who have access to nuclear weapons have access to and work to master.

Nuclear weapons thus made the calculation of "next moves" central to strategy. A mistake, a careless decision, or a misestimate could lead to a lot more than political embarrassment. Big decisions over war or peace were broken down into lots of smaller ones about the use of force and where it might lead.

And even the smallest decisions got high-level attention. In the Berlin crisis of 1948, the decision as to the kind of rifles U.S. guards carried on trains running to Berlin, M-1s or carbines, was kicked all the way up to the White House.

The skill needed to identify these smaller decisions was learned on the job. It was not anticipated. Everything said here about the calculated use of force to achieve various purposes, basing decisions about using force on estimates of an opponent's reaction, breaking down sweeping decisions on war or peace into much smaller "chunks," and high-level attention given to micro moves—none of this was foreseen. It was "discovered" by national leaders and, even then, usually after they got into a crisis.[3]

What the Putin threat is really about is putting on the table elements of trying to dominate escalation management.

"If you respond to my violations of the INF treaty, by actually reshaping your capabilities to defense your allies, I would move my chips on the table and move to destroy you at the heart of government with a new technology which you have no response to."

Sounds interesting: but let us look at how Putin is working to shape an escalation declaratory control policy and how the United States cannot just respond, but pre-empt?

This is not about arms control; it is about the maneuver space in a pre-crisis situation in which declaratory policy coupled with capabilities can shape outcomes, without even firing a shot.

Dealing with the Sub-Launched HSCM as a "Smaller Chunk" Within Escalation Dominance

Developing and showcasing a sub-based hypersonic cruise missile can be considered a "smaller chunk" in any escalation/de-escalation cycle.

Since the beginning of the first nuclear age into the second not only are the technological capabilities and intentions of force capabilities of paramount importance, it is also the intangibles of information war (IW) statements that directly impact on Professor Bracken's point about any ops-tempo in times of crises.

Russia's Putin understands Information War messaging about the use of nuclear weapons:

"All Russians will go to heaven" as recently stated by a "deeply" religious former KGB Officer.

"About a third of the way through, Putin conjured the specter of nuclear war, most likely with the United States, though he didn't name the enemy explicitly.

"As martyrs, we will go to heaven," he promised.

"And they will just croak because they won't even have time to repent."[2]

Defense.info

What a really nasty statement.

But it almost certainly aimed at Islamic extremists and is designed to take off the table any advantage that would accrue to those who believe that Russians fear death at the hands of Islamic extremists.

Now in addition to his IW mysticism he has personally threatened America, especially President

Trump and his family, by having the White House and Camp David mentioned on his target list.

This is threatening on so many levels.

The US Navy is standing ready at all levels of combat effectiveness, because in over a hundred years of successful Anti-Submarine Warfare (ASW) from the Chief of Naval Operations down Navy Leadership has always recognized that the future is now in standing ready to meet threats.

The President of Russia in February 2019 directly threatened the US with a nuclear strike from his submarine fleet off our East Coast. He and his war planners must be puzzled by a simple question; how did the United States already anticipate this threat?

Navy Chief of Naval Operations seemingly knew that Putin would eventually make such a bold threat.

President Putin and your sailors meet our newly reestablished 2nd Fleet established by CNO Admiral John Richardson, who graduated from the U.S. Naval Academy in 1982 with a Bachelor of Science in Physics.

As Admiral Richardson noted at the ceremony establishing the command:

"Although deeply consequential, the meaning of this establishment can be summarized simply as a dynamic response to a dynamic security environment — a security environment clearly articulated in the National Defense Strategy," said Richardson.

"We first need to understand this competitive security environment and why it demands every ounce of our tenacity, ingenuity and fighting spirit. Then we can focus on the mission and how best to accomplish it; 2nd Fleet will enhance our capacity to maneuver and fight in the Atlantic, and as a result, help to maintain America's maritime superiority that will lead to security, influence and prosperity for our nation."[3]

Put in blunt terms, the US Navy has anticipated what Putin is now trying to establish as an advantage in a future battle.

But the Navy is clearly working the challenge of preparing and training for a 21st century battle of the Atlantic.

And this time, the US Navy is leveraging not just its own service technology but the full panoply of what the joint and allied forces can provide as well to shape a nuclear-nuclear-tipped kill web that can dominate in a crisis and provide significant maneuver space for the President in dealing with Putin in a pre-crisis situation.

It is not about assuming strategic dominance with a so-called anti-access and area denial approach; it is about having to confront a 21st century combat force which is constantly innovating and training to defeat a peer competitor.

As the CNO noted in 2016:

"To ensure clarity in our thinking and precision… We'll no longer use the term A2/AD as a stand-alone acronym that can mean all things to all people or anything to anyone – we have to be better than that."

"Since different theaters present unique challenges, 'one size fits all' term to describe the mission and the challenge creates confusion, not clarity. Instead, we will talk in specifics about our strategies and capabilities relative to those of our potential adversaries, within the specific context of geography, concepts, and technologies."[4]

Remember Putin — we shoot back.

And before that we have significant maneuver forces to affect pre-crisis decision making of even the consummate chess player like Putin.

The Impact of a "Ready on Arrival" US Navy on Crisis Management

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

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

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

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

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

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

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

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

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

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

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

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

Defense.info

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

Psalms 107:23-31

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

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

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

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

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

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

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

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

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

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

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

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

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

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

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

They moved like real warriors.

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

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

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

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

21st Century Anti-Submarine Capability as a Key Element for Shaping Escalation Dominance

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

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

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

How would you characterize the Russian dynamic?

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

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

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

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

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

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

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

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

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

Defense.info

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

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

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

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

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

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

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

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

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

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

The SWO boss, Admiral Rowden, has been pretty adamant about the benefits of their Warfighting Development Center, the Surface and Mine Warfighting Development Center.

"SMWDC has been, in my mind, going full bore at developing three different kinds of warfare instructors, WTIs.

"They have an ASW/ASUW, so anti-surface and anti-submarine warfare officer.

"They have an IAMD officer and they have an expeditionary warfare officer. We are watching young lieutenants share with their bosses in a training environment, specifically during IADC (Integrated Air Defense Course).

"This is probably not the way we want AEGIS set up, or how we want the ship to be thinking in an automated mode.

"We may not previously have wanted to go to that next automated step, but we have to because this threat is going to force us into that logic.

And you're seeing those COs, who were hesitant at first, say, "Now after that run in that event, I get it. I have to think differently.

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

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

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

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

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

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

We published a report on our visit to Jax Navy in 2016 and provided the following over to the report which outlined key elements of how the Navy was positioning itself to provide building blocks for escalation dominance against peer adversaries.

On May 23 and 24, 2016, during a Jacksonville Naval Air Station visit, we spent time with the P-8 and Triton community which is shaping a common culture guiding the transformation of the ASW and ISR side of Naval Air. The acquisition term for the effort is a "family of systems" whereby the P-3 is being "replaced" by the P-8 and the Triton Remotely Piloted Aircraft.

But clearly the combined capability is a replacement of the P-3 in only one sense – executing the anti-submarine warfare function. But the additional ISR and C2 enterprise being put in place to operate the combined P-8 and Triton capability is a much broader capability than the classic P-3. Much like the Osprey transformed the USMC prior to flying the F-35, the P-8/Triton team is doing the same for the US Navy prior to incorporating the F-35 within the carrier air wing.

In addition to the Wing Commander and his Deputy Commander, who were very generous with their time and sharing of important insights, we had the opportunity to interviews with various members of the VP-16 P-8 squadron from CO and XO to Pilots, NFOs and Air Crew members, along with the wing weapons and training officer, the Triton FIT team, and key members of the Integrated Training Center. Those interviews will be published over the next few weeks.

The P-8/Triton capability is part of what we have described as 21stcentury air combat systems: software upgradeable, fleet deployed, currently with a multinational coalition emerging peer partnership. Already the Indians, the Aussies and the British are or will be flying the P-8s and all are in discussions to build commonality from the stand-up of the P-8 Forward.

Software upgradeability provides for a lifetime of combat learning to be reflected in the rewriting of the software code and continually modernizing existing combat systems, while adding new capabilities over the operational life of the aircraft. Over time, fleet knowledge will allow the US Navy and its partners to understand how best to maintain and support the aircraft while operating the missions effectively in support of global operations.

Reflecting on the visit there are five key takeaways from our discussions with Navy Jax.

A key point is how the USN is approaching the P-8/Triton combat partnership, which is the integration of manned, and unmanned systems, or what are now commonly called "remotes". The Navy looked at the USAF experience and intentionally decided to not build the Triton "remote" operational combat team that is stove piped away from their P-8 Squadrons.

Defense.info

The team at Navy Jax is building a common Maritime Domain Awareness and Maritime Combat Culture and treats the platforms as partner applications of the evolving combat theory. The partnership is both technology synergistic and also aircrew moving between the Triton and P-8

The P-8 pilot and mission crews, after deploying with the fleet globally can volunteer to do shore duty flying Tritons. The number of personnel to fly initially the Tritons is more than 500 navy personnel so this is hardly an unmanned aircraft. Hence, inside a technological family of systems there is also an interchangeable family of combat crews.

With the P-8 crews operating at different altitudes from the Triton, around 50K, and having operational experience with each platform, they will be able to gain mastery of both a wide scale ocean ISR and focused ASW in direct partnership with the surface navy from Carrier Strike Groups, ARG/MEUs to independent operations for both undersea and sea surface rather than simply mastering a single platform.

This is a visionary foundation for the evolution of the software upgradeable platforms they are flying as well as responding to technological advances to work the proper balance by manned crews and remotes.

The second key point is that the Commanders of both P-8 aviator and the soon to be operational Triton community understand that for transformation to occur the surface fleet has to understand what they can do. This dynamic "cross-deck" actually air to ship exchange can totally reshape surface fleet operations. To accelerate this process, officers from the P-8 community are right now being assigned to surface ships to rework their joint concepts of operations.

Exercises are now in demonstration and operational con-ops to explain and real world demonstrate what the capabilities this new and exciting aspect of Naval Air can bring to the fleet. One example was a recent exercise with an ARG-MEU where the P-8 recently exercised with the amphibious fleet off of the Virginia Capes.

The third key point is that the software upgradeability aspect of the airplane has driven a very strong partnership with industry to be able to have an open-ended approach to modernization. On the aircraft maintenance and supply elements of having successful mission ready aircraft it is an important and focused work in progress both inside the Navy (including Supply Corps) and continuing an important relationship with industry, especially at the Tech Rep Squadron/Wing level.

The fourth point is how important P-8 and Triton software upgradeability is, including concurrent modification to trainer/simulators and rigorous quality assurance for the fidelity of the information in shaping the future of the enterprise. The P-8s is part of a cluster of airplanes which have emerged defining the way ahead for combat airpower which are software upgradeable: the Australian Wedgetail, the global F-35, and the Advanced Hawkeye, all have the same dynamic modernization potential to which will be involved in all combat challenges of maritime operations.

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

The fifth point is about weaponization and its impact. We have focused for years on the need for a weapons revolution since the U.S. forces, and as core allies are building common platforms with the growth potential to operate new weapons as they come on line. The P-8 is flying with a weapon load out from the past, but as we move forward, the ability of the P-8 to manage off board weapons or organic weapons will be enabled.

For example, there is no reason a high-speed cruise or hypersonic missile on the hard points of the P-8 could not be loaded and able to strike a significant enemy combat asset at great distance and speed. We can look forward to the day when P-8s crews will receive a Navy Cross for sinking a significant enemy surface combatant.

In short, the P-8/Triton is at the cutting edge of naval air transformation within the entire maritime combat enterprise. And the US Navy is not doing this alone, as core allies are part of the transformation from the ground up.

A Look Back at the History of US Navy ASW Con-ops and Capabilities

The view of the US Navy and its approach to ASW throughout history was laid down over sixty years ago by one of the most accomplished CNO's in Naval History, Admiral Arleigh Burke.

Chief of Naval Operations Admiral Arleigh Burke initiated "Project Nobska," which carved out a way ahead for the US Navy to deal with ASW against nuclear submarines, as well as focusing on new technologies to defend against them [1]

It is only fitting given his focus that the best class of destroyers ever built were named for "31 Knot" Burke; Burke's standing order in all cases was: "Destroyers to attack on enemy contact WITHOUT ORDERS from the task force commander."[2]

admiral Burke summed up his approach in an address written and delivered in 1959:

"The United States is ahead in its ability to use and exploit the sea, in antisubmarine warfare doctrine and capabilities, in the application of naval air power from carriers at sea, in guided missiles at sea.

"These capabilities did not come overnight.

"They are the result of solid thinking and hard work, hours, days, and years of attention to the many jobs the Navy has to do.

"They are the result of cool determination, and the intelligent application of always-limited resources." [3]

The Burke class destroyers and their evolution in the form of the Aegis system embody his thinking and his approach.

According to the US Navy:

"Arleigh Burke Class (DDG 51) Destroyers are warships that provide multi-mission offensive and defensive capabilities. Destroyers can operate independently or as part of carrier strike groups, surface action groups, amphibious ready groups, and underway replenishment groups."[4]

It is past being ironically priceless that President Putin's own news reporting publication *Sputnik News* actually notes the fighting characteristics and combat utility of Burke Class Destroyers.

According to a 2018 article in *Sputnik News*:

The US Navy has sent invitations to the private sector to submit bids to build Arleigh Burke-class destroyers, the service's top weapons buyer said last week.

Speaking at the WEST 2018 conference last week, James Geurts, assistant secretary of the Navy, said that a new contract lasting from 2018 to 2022 to produce Flight III Arleigh Burke-class vessels was up for grabs. The destroyers will be built either at Bath Iron Works in Maine or the Ingalls shipyard in Mississippi, or perhaps both. Defense.info

Specifically, the Flight III Arleigh Burke ships feature Raytheon's AN/SPY-6 radar, an active electronically scanned array air and missile defense 3D radar. In advertising the radar on its corporate page of "7 fast facts about the navy's newest radar — and how it will keep the world a safer place," the firm boasts, "it has 'spy' in its name."

Most of the 2017 funding for the Arleigh Burke program went into modeling and designing the vessel to incorporate new radars, USNI News reports.

"The Navy has worked with our industry partners to develop the Flight III testing to ensure each shipyard is well-positioned to execute this [multiyear procurement contract," Geurts said in an announcement.

The destroyers can carry out a variety of tasks including anti-air warfare, anti-submarine warfare and anti-surface missions.[5]

But wait it gets even better.

Dating from our "Ready Now" destroyer's beginning with the fight against German subs in WWI to WWII throughout the Cold War to today destroyers they have always been a huge contributor to Victory at Sea.

In World War I, the US Navy provided destroyers to the conflict against German submarines and their war of attrition against Britain.

Less than 25 years later, the Hunter-Killers of WWII again won the Battle of the Atlantic against German U-Boats.

"In the central and southern Atlantic, F-21 and Tenth Fleet served as the brains while the ships of the Atlantic Fleet provided the brawn for the U.S. Navy's antisubmarine warfare offensive against Axis submarines.

"Smaller sized escort carriers were already sailing near Allied convoys, providing air coverage and thwarting U-boat attacks.

"After 1943, U.S. Navy escort carriers shifted to the offensive. While the British deployed escort carriers with convoys in the North Atlantic, the Americans formed autonomous "hunter-killer" antisubmarine task groups.

"A typical U.S. Navy hunter-killer task group consisted of a number of escort vessels like Destroyers (DD) and Destroyer Escorts (DE), which were centered on an escort carrier (CVE).

"Usually, the hunter-killers would sortie from Hampton Roads to a designated operations area. Afterwards, hunter-killer formations would either return to home port or continue on to alternate ports such as those in North Africa for refits, refueling, and rearmament.

"Maintaining a continuous circuit along the Allied convoy routes and in U-boat operations areas, U.S. Navy hunter-killers were a constant threat to U-boats after 1943." [6]

Enter the Cold War as a precursor and prologue to the new age Russian challenges highlighted by President Putin.

A documentary was made by Edward R Murrow, who global history has honored as a very serious and honest journalist. Murrow made his point about a naval revolution over six decades ago and it is still extremely important to this day:

"The cold opening of this November 18, 1956 black-and-white episode of Edward R. Murrow's "See It Now" CBS television documentary series shows the viewer the wheel of the USS Constitution — "Old Ironsides" — the wooden-hulled, three-masted heavy frigate launched in 1797 and the oldest commissioned warship afloat in the world, with the narrator then launching into a discussion of the revered vessel's history.

"From there, the viewer is shown the wheel of the USS Forrestal (CV-59), a supercarrier, and her sister ship, USS Saratoga (CV-3).

"Currently there is a revolution in the navy.

"A revolution in ships and in weapons and in men.

"A revolution that really began in 1939 when (Albert) Einstein wrote a letter to the President about a new kind of bomb which he predicted would be carried by boats and be capable of enormous destruction."[7]

Put in blunt terms, the weight of history of US Naval operational experience and evolving kill web technology are now to be directed against the threat which Putin now poses directly against the United States and its guarantees to NATO.

The Contribution of the Zumwalt in the Kill Web Approach

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

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

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

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

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

His key take away is that the Navy has proven to be absolutely ruthless in dealing with technology.

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

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

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

In an article which Timperlake published in The Washington Times a decade ago, he looked at how the Zumwalt can address the ASW challenge effectively.

Defense.info

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

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

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

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

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

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

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

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

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

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

The Role of the F-35 in the Kill Web Approach

It is now time to accept that a war-changing weapon, HSCM is in the late stages of R&D and it must be accounted for in any battle plan.

Unlike distant "hyper-sonic" R&D efforts such a Global Strategic Strike aircraft, a hypersonic cruise missile is a rapidly evolving technology, which sooner than later will be demonstrating the art of the possible up close and personal.

Such a revolutionary CM in the US arsenal is a very good thing. In the hands of Russian forces, it is a very real "wolf at the door."

Consequently when, not if, a hypersonic-Cruise Missile is battle ready the Air/Sea Battle staff will have to figure out both offensive and defensive con-ops.

In sufficient numbers a hypersonic cruise missile can be a war-tipping asset.

Employed by US and Allied forces the capability will greatly enable a deadly combat punch.

If it is in the hands of an enemy a hypersonic cruise missile is a ship killer and now a direct strategic threat to the US.

The Cold War USN Carrier Battle Group protection mantra against Russian Bombers with anti-ship cruise missiles was to try and first kill the archer not the arrows.

Top Gun in the late eighties briefed "Chainsaw" tactics, and the F-14 was very well designed for long-range interception of threats against the Fleet.

"Chainsaw" was a focus on reaching out as far a possible against any threats.[1]

Now if Russian and/or PLAAF successfully air launch HSCMs or their missiles are launched from ground batteries or surface ships or subs (USN fast attack subs are of utmost importance in that battle) they will be engaging in their version of the S-3 formula.

Just like the USN and USAF they first need sensors to make it all work.

The order of the "S" words in the priority of formula is very important.

If they develop a HSCM to empower their fighting force the F-35 does not have to fight in the stealth mode against HSCMs.

Even if HSCMs move at Mach 10 an F-35 sensor platform moves "troins" at the speed of light and this can make all the difference.

It is very evident that all fighting forces need both reach and range.

The F-35 today can play both stealth and non-stealth and is a generation better than any other aircraft in the world.

One just has to look at Russian and PLAAF attempts to develop a real F-35 capability and their stealth airframe is lacking the sensor systems comparable to F-35.

It is a pure marketing assertion that they have fusion parity and DAS.

Defense.info

The F-35 "360 Degree Fusion Cockpit" is good for a decade or more as the never-ending action/reaction cycle of our enemies attempt to make their technology and training moves to catch up to the United States.

The US and its Allies are the only airpower thinkers and practitioners that can learn TTPs when F-35, F-22 and legacy aircraft mix it all up at a Red Flag. Russian and PLAAF cannot do that training within a decade.

They might claim that they are building fusion cockpits in stealth jets-but currently just by looking at their airframes with no nose sensors or wing sensors, they are simply fusing linear improvements to radar systems. They do not have the complete 360-active/passive reach that the F-35 brings to AA, AG and EW fight.

There is one other significant factor of HSCMs.

A ship has an advantage in that it can maneuver at sea; it also has a distinct disadvantage if a mortal blow is landed it sinks.

In contrast, an airfield or strategic target like the White House or Camp David has a disadvantage in that it they are a very well-known fixed point on land.

Training for the Kill Web

Both the US Navy and US Air Force have the vision and resources to develop the most modern training ranges in the world and a dedicated unified approach to collecting operational intelligence against HSCM airborne "signatures."

During a visit to Nellis AFB Major General Jay Silveria, then the Commander of the USAF Warfare Center, pointed out that one of the missions of his command is to create a mission file for the F-35 fleet.

"The mission file includes all of the data about every threat, aircraft, surface-to-air missile, blue aircraft, and airliner, whatever that airplane may see during its flights.

"That intel mission data will fill the mission data file that will build is what the airplane then goes in and looks to see when it fuses that target.

The mission data file that we're building right now in the 513th at the 53rd wing which are part of the Warfare Center were initially building are for the Marines."[2]

The value is that USAF, USMC, USN and Allis have the possibility of working off that same mission data library.

The very practical application and perhaps battle tipping aspect of a fleet wide mission data file is that if just one F-35 anywhere anytime gets hit on a HSCM, the entire fleet can have the data.

This is unique capability to be able to prevail in modern war.

Concurrently, the Navy at Fallon is also building a significant training complex for practicing current con-ops and looking forward to studying how to defeat future threats.

Rear Admiral Scott Conn was Commander of Naval Strike and Air Warfare Center during our visit in 2014. He is now head of Naval Aviation at N-98.

According to Admiral Conn, "We are working at Fallon at expanding the capability for Naval aviation to operate in an expanded battlespace." [3]

And the Admiral made it clear that this was being done with adding capabilities like the F-35, and leveraging joint and coalition capabilities into what we are calling an attack and defense enterprise.

He and his team are spearheading a broad-based effort to expand the envelope of training to combine live and virtual training by building a Live, Virtual, Constructive (LVC) training range as well, an approach well under progress at Fallon.

Rear Admiral Michael Manazir, when he was Director of Naval Air Warfare identified the Navy way ahead that will allow tactical innovation and practices for the best way to attack and destroy incoming HSCMs.

The threat baseline that we're looking to fight in the mid-2020s and beyond is so much more advanced that we cannot replicate it using live assets. And those advances are in the aircraft capability, the weapon capability, and in the electronic warfare capability of the threat systems.

That drives us to thinking about a different way to train.

Live, virtual, constructive (LVC) training is a way to put together a representation of the threat baseline where you can train to the very high end using your fifth-generation capability.

Some of it is live with a kid in the cockpit, some of it is virtual in a simulator, and so "virtual" is actually the simulator environment.

And then constructive is a way to use computers to generate a scenario displayed on either or both of the live or simulated cockpit.

You can also combine them to be live-constructive, or virtual-constructive, and by that, I mean there are systems out there right now that you can install in the airplane that will give you a constructive radar picture air-to-air and surface-to-air along with the electronics effects right onto your scope.

You're literally flying your airplane, and through a data link, you can share that information between airplanes, you can share it between dissimilar airplanes.[4]

Thus, a key way ahead for R&D and con-ops to deal with the coming HSCM threat is clear.

The F-35 does not have to be in a stealth mode to sense and engage against HSCM racing at a CSG–it can go out and loiter as a 360-sensor picket platform and can empower the kill web with its detection capabilities.

The S Cubed Revolution

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

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

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

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

Defense.info

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

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

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

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

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

The CNO was exactly right.

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

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

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

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

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

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

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

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

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

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

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

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

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

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

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

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

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

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

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

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

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

Stealth dynamically over time will become more vulnerable as the ensors improve for enemy systems.

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

Modern air combat, just like submarine warfare is essentially an evolving contest of “blind man’s bluff.”

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

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

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

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

As the former CNO says “payloads over performance.”

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

Defense.info

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

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

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

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

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

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

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

Shaping a Way Ahead

In a 2011 paper by Ed Timperlake entitled "winning Air/Sea Battle" only looked at F-35 as early warning platform [1]

In that paper on the F-35s as providing a "heads up" to fleet surface ships about "incoming" missiles threats but in the non-stealth mode the F-35 can carry more ordinance than F/A-18 or F-16.

So instead of just a "heads-up" to the NORTHCOM/NORAD Commander or an Admiral commanding a Carrier Strike Group to make ready American shore defenses or a fleet for close in defensive measures, why can't an F-35 carry anti-HSCM designed ordinance to kill HSCMs in flight?

Design a missile that can link to the fusion cockpit for an immediate fire control solution and launch a missile with an appropriate warhead to take down an incoming HSCM.

In an email exchange with Dr. Lewis, he raised a significant challenge which needs to be addressed in R and D and the shaping of effective con-ops.

"The biggest threat I see is actually a swarm attack of high-speed incoming, that might overwhelm any solution. The Chinese have been rather open about this tactic."

"It is very fair to say it is truly a wicked problem, but he also adds; "the good news is there are indeed solutions that will stop them."

"The one point in favor of the HSCM intercept to a kill shot is the need to just get in front of the missile with something that abruptly and directly disrupts its forward motion.

"The key to defeating it is to make it beat itself to death– the old joke about you only have to be close in horseshoes and hand grenades applies."

Again quoting Dr. Mark Lewis from that email exchange:

"One method of stopping them simple kinetic will be effective, with the challenge that a high-speed maneuvering missile will be rather hard to catch with dumb ordnance.

"And with a rapid closing speed, the window for that kill chain is of course small.

"There are other very promising options as well.

"Stability and control of a hypersonic craft is a key element. The DARPA HTV-2 failed twice due to control losses, something that the Air Force warned DARPA about ahead of time.

"In the case of HTV-2 flight 1, the loss occurred due to yaw-roll coupling; essentially, the vehicle developed a small asymmetry, began to yaw, and corrective control action caused it to roll out of limit.

"That was a case of bad design, but also an example of how easy it is to mess with these craft.

"HTV-2's second flight was lost because an important protection system failed again making it uncontrollable.

"I can't help drawing an analogy to the old German V-1's, that could be disabled by flying alongside in a fighter and hitting their wing tips. The resulting roll made them unstable!

"The third flight of X-51, where a fin broke off the cruise vehicle during solid rocket boost, and when it separated from the solid motor (at Mach 4.8) it almost immediately lost control. So, when you are flying at hypersonic (or even supersonic speeds) and take even minor damage, survival is unlikely.

"Coincidentally, and as a funny historical quirk, there is a pretty long list of hypersonic programs that have been lost due to fin failures completely unrelated to the hypersonic portion of the flight: X-43 first flight, the Australian HyShot first flight, and now most recently, AHW's second flight.

"That last one is especially painful; the booster lost a fin a few inches above the launch pad due to an entangled thermal blanket.

A hypersonic missile must travel between Mach 5 and Mach 10, or 3,840–7,680 miles per hour in order to be considered hypersonic.

One should think a mile a second.

By comparison, a current missile AA missile, the AIM-120 has the characteristics seen in the graphic to the left (credit Wiki).

Thus, there is a speed differential of between 1 and 6 Mach and also the HSCMs are also in flight, the intercept missiles are at a standing start.

The first look at intercepting a HSCM inbound against the fleet is one of the first verbal math problem we all had in Algebra 1- "A train leaves a station going 50 mph… Another train leaves it's station going 80 mph.. etc. etc."

The logic of that example is that both HSCM and intercept missile are on the "same track" and a parallel track for a perfect "face-shot."

However, the crossing angle to intercept may be much more significant, say for example an F-35 flying on a heading of 090 and the pilot's cockpit's fusion display picks up a HSCM coming at the Fleet heading 180 and

Defense.info

the closes point of approach for the physical passing of the F-35 on station and HSCM for intercept is offset by say 30 miles and at a different altitude.

The F-35 sensor shooter for an example could be 90 degrees off the nose for an intercept vector and also off set by some miles and altitude from the physical closes point of approach, this is a very hard shot.

The F-35 at best can try to point and shoot with the missile arming and independently maneuvering but having been initially launched many degrees off the aircraft's initial route of flight.

The challenge is that at some point in space and time, the kill missile must get in front of the HSCM.

It is not necessary to hit a bullet with a bullet.

With the current significant Mach differential shown above a conventional missile cannot run down a HSCM.

With focused R&D perhaps a future hypersonic-interceptor missile is possible but, in this example, I am using the current art of the possible and assuming a +6 Mach advantage given to the HSCM and it is already in flight while interceptor missile is on the rail at the start.

Therefore, detection and reaction time for launch and missile light-off the intercept angle for the missile altitude differential make time and distance of flight against HSCM everything.

At around 88 miles per minute incoming, depending on altitude it is a very hard problem.

The first issue is simply just getting a missile off an F-35 in the time of calculation for sensing something approaching at a high rate of speed.

Using the CNO's formula heat=sensing, an F-35 can see something moving very fast at a distance.

How far away is one key BUT not a showstopper.

Because if the F-35 can sense at a whatever distance it is reacting electronically at the speed of light and there is the possibility of doing something about it.

Slaving an immediate launch fire-control solution from the F-35 fusion cockpit sensed HSCM route of flight vector to an interceptor missile loaded on the aircraft hardpoints is one way.

But just as significant the F-35 sensor can off load the kill shot to another F-35 with a better chance.

To have any chance of success the launching F-35 has to have a certain head on aspect – if the HSCM is beyond the wing-line the engagement is lost at first detection.

The kill-shot game for that one F-35 in launching a counter-missile is already be over.

But now think of a 21st Century "chainsaw" as a solution set and a way ahead.

The USN strike commander is currently using F/A-18s to refuel F/A-18s. Since stealth in not an issue against an HSCM swarming missile attack, a mix of F-35s with F/A-18 tanking assets can put as many F-35s on a combat air patrol station as far away from the surface fleet as possible for early detection. That effort can then feed-back for defense in depth combat engagements.

Against even a Mach 10 threat the F-35 data linked information dominance sensor can off load at the speed of light the incoming track of swarming inbound HSCM threats to other F-35s standing CAP right over the Fleet.

Additionally, all USN combat platforms can also light up; AEGIS ships, Growlers, E-2 Hawkeyes and other close in defensive combat weapon systems.

Additionally, the Ford CVN-78 has been specifically designed with an area on the flight deck to configure the air wing aircraft quickly and efficiently with the appropriate ordinance for the appropriate mission.

In alternating between offensive strikes, using active or passive stealth with weapons in a weapons bay or non-stealth with a significant weapons load, the combat ordinance on an F-35 can be configured quickly.

As the combat situation dictates the defensive requirements of loading anti-HSCM missiles as stated above can also be done quickly. USN ship design teams working on the CVN-78 figured this all out; switching ordinance and/or reloading.

It is no small issue; the Japanese carriers were sunk at the battle of Midway because they were caught in an arming, de-arming, arming cycle. From that moment forward they were going to lose the war.

The challenge for the R&D community is to immediately give a lot of thought and research on what type of ordinance, missiles and warheads are best to defeat a HSCM.

The challenge for strategic planning is to consider a return "back to the future" and establishing an East Coast Air Defense string of bases for the F-35A/B/C.

F-35 wide area sensing targeting and mapping capability against, air -breathing HSCM, enemy aircraft and surface ships is beyond excellent.

They can fulfill the target acquisition requirement of a Payload Utility function.

"The difference between a good and great officer is about ten seconds". Admiral Burke.

The US Navy now has many great officers moving in the air at sea and under the ocean surface at light speed sensing, acting and if necessary killing.

If F-35s are stationed to stand air defense alert in a 21st Century "Cold War basing" con-ops from Otis ANG Base to NAS Pax River, (or Quantico air field) Langley field, NAS Oceana, MCAS Beaufort and NAS Key West (Bocha Chica) then appropriately networked to other "kill shot" platforms both at sea and Army ADA we might survive an attempted first strike.

If Putin and the Russian military saw this type of preparedness they might always hesitate.

Even if a Russian cruise missile sub gets off a shot it is dead dead dead because the F-35, P-8 and Triton will know exactly where it is on launch and can deliver an effective payload for its defeat and provide other options as well.

The Future is Now

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

Defense.info

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

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

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

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

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

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

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

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

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

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

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

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

Courage does run deep.

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

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

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

There is the opportunity of a test range proof of concept to fight at the speed of light.

Station two F-35s in over hundred mile trail formation in the Atlantic 386 warning area along with an Aegis Burke Destroyer somewhere in the same area.

Now as two very smart former USAF 0-6 Test pilots proposed, run high speed F-104s on the deck at their best speed to simulate incoming cruise missiles.

Engage the threat using the F-35s and Aegis to communicate with each other the incoming threat vectors to get weapons on.

Even at a mile a second of incoming treats the Navy Kill Web is operating at light speed in tracking and targeting.

Using Putin's threat of max distance of 620 miles when detected at launch that distance gives a fighting force 620 seconds or if 2x that speed (doubtful right now) 310 seconds.

That is more than enough time to get kinetic weapons engage for a successful shot. 310 seconds is a life time to engage for a fighter pilot.

And the Navy surface Fleet lives with the famous Admiral Arleigh Burke's great quote-"the difference between a good officer and a great officer is 10 seconds"

HSCM have a very serious flaw in that whatever "force" kinetic or DE disrupts the laminar flow by molecules it will beat itself to death—Close counts in hand grenades, horseshoes and killing HSMC if the shot has a head on aspect

I am 100 percent convinced that the Navy Admiral commanding our newest Fleet, the Atlantic's 2nd Fleet is up to the challenger of letting no threat go unchallenged.

He has the means motive and opportunity to test right now how his fleet can be a HSCM Killer.

Proof of concept off the Atlantic Coast can easily migrate threats from the Baltics and South China Sea.

PART VII: THE NUCLEAR WEAPONS PIECE AND THE F-35

The return of nuclear weapons as a key currency for global power and the rise of several new nuclear or powers at the threshold of possessing nuclear weapons has created a second nuclear age. It is one, which is largely ignored, in strategic discourse where the assumption is that the rules, which were shaped by the US and the Soviet Union in the first nuclear age, somehow apply; they don't.

As Paul Bracken has put it: "In the first nuclear age there was a single overarching nuclear rivalry. It took only two to tango, so to speak, in order to moderate any provocations, limit the dynamics, and reduce the number of bombs through arms control.

Today, the number of bombs is much reduced from cold war levels, but the number of rivalries that have taken on a nuclear context has increased. These rivalries, anchored in the regions but with global impact, have more deeply embedded the bomb in international affairs than was the case even during the cold war."

Defense.info

It is about a power like North Korea becoming nuclear capable and working to shape long range strike capabilities against the United States and the need for the United States to shape a real strategy for the decapitation of the North Korean regime and the elimination of the strike assets of that nation against the U.S. and the allies which rely upon it for nuclear deterrence.

It is about having a credible and plausible strike and defense package, which can devalue the ability of the small nuclear power, from credibly using its weapons. It is about attenuating the credibility of a small power using its weapons as the only real path to deterrence.

It is not about running political campaigns for a nuclear free world; it is not about simply having an existential capability to destroy one's enemy; it is about having nuclear forces integrated enough within a precision strike force capable of defeat of a small nuclear power.

Bracken on Escalation Dynamics

We have worked with Paul Bracken for some time on what he has termed second nuclear age issues. When he was working for Herman Kahl, Robbin Laird was working for Dr. Brzezinski and they started their conversation son nuclear deterrence from the mid-1970s.

What follows is Bracken's piece which we published on the return of escalation dominance as a key strategic capability with the return of great power competition.

The United States has recognized a return to major power rivalry in recent official documents such as the National Security Strategy and the Nuclear Posture Review.

This is a useful step that catches up to a reality that analysts and many others have argued has been underway for some time.

It is especially important because it opens up new pastures for exploring strategy that have been overlooked because of the nature of American involvement in low intensity wars of counterinsurgency and anti-terrorism for nearly two decades.

In low intensity environments certain things are taken for granted, like air superiority, cyber dominance, and freedom of strategic access.

Obviously, these conditions cannot be assumed to hold in an environment of major power conflict.

Recognizing the change from a low to a more intense conflict environment in official documents is one thing.

But reshaping operations and strategy for this environment is something else altogether.

One of the main reasons the outbreak of World War I was such a surprise to everyone was that the preceding two decades had seen repeated political crises where there was a show of force – but no actual combat between the major powers.

They had grown accustomed to this and believed that every crisis would play out this way, with strong messages and force maneuvering, but without combat.

There was no crisis management that existed for actual combat, especially the early clashes of the campaign.

No one, for example, had conceived of limited strikes or retaliation, force disengagement, or messaging once the shooting started.

The result was that the generals and mobilization plans took over.

The key point for today is that there are many levels of intensity above counterinsurgency and counter terrorism, yet well short of total war. In terms of escalation intensity, this is about one-third up the escalation ladder.

Here, there are issues of war termination, disengagement, maneuvering for advantage, signaling, — and yes, further escalation — in a war that is quite limited compared to World War II, but far above the intensity of combat in Iraq and Afghanistan.

While a full-scale replay of a "1914 scenario" is always possible, there are several reasons to think that a limited war is more likely than an all-out one.

Two factors stand out.

First, the fact that an actual shooting war had started between the United States and Russia or China might produce a mutual shock reaction that swamps politics.

Whatever the differences were – protection of Taiwan or the Baltics – would pale in comparison to the fact that the United States and Russia were fighting.

Second, while we are talking about limited war, it is a war between thermonuclear powers.

The political focus in an early clash is going to be on "where things might go" if it goes on.

There are many implications of focusing on "one third up the escalation ladder" wars. Attacks are designed more to end the conflict than to destroy enemy forces outright.

A particular area of focus should be exemplary attacks.

Examples include select attack of U.S. ships, Chinese or Russian bases, and command and control.

These are above crisis management as it is usually conceived in the West.

But they are well below total war.

Each side had better think through the dynamics of scenarios in this space.

Deep strike for exemplary attacks, precise targeting, option packages for limited war, and command and control in a degraded environment need to be thought through beforehand.

The Russians have done this, with their escalate to deescalate strategy.

I recently played a war game where Russian exemplary attacks were a turning point, and they were used quite effectively to terminate a conflict on favorable terms.

In East Asia, exemplary attacks are also important as the ability to track US ships increases.

Great power rivalry has returned.

A wider range of possibilities has opened up.

But binary thinking — that strategy is either low intensity or all-out war – has not.

This lesson is too important to learn in the real time pressures of war.

Defense.info

https://sldinfo.com/2018/04/one-third-up-the-escalation-ladder/

Meeting the Russian Nuclear Challenge

Nuclear deterrence is back on the agenda for NATO and the United States.

The buildup of the Russian missile arsenal, short, medium and long range, with clear violations of INF limitations are designed less to create a so-called anti-access and area denial capability than an arsenal designed to make the recovery of classic conventional deterrence seem beyond reach in Europe.

The anti-access and area denial bit is really about defending the Kola Peninsula, the largest concentration of military force in the world as well as the always-vulnerable "European" Russian area.

But with the gaping holes in European defense capabilities and the with the United States working to repair the focus on the land wars, there clearly is a major gap in a credible continental conventional deterrent force.

In this sense, the ability to combine hybrid warfare means, significant offensive strike missiles, and an ability to blend in low-yield nuclear weapons in the mix are designed to give the Russians flexibility in coercing European states.

With such an approach, how can European states, European NATO and the United States enhanced a credible warfighting approach, which can deter the Russians?

But what might a credible US and European offensive-defensive capability which could leverage nuclear weapons in a crisis look like?

Recently, we discussed this difficult question with our colleague Paul Bracken, the author of the *Second Nuclear Age*.

We agreed that significant political and military changes in both Europe and the United States requires its own analysis.

Bracken started by highlighting what he sees as two baseline realities facing analysis of nuclear deterrence in Europe today.

"There is widespread belief that nuclear weapons will never be used and should be factored out of any European defense discussion. Nuclear incredulity is a key barrier to doing any analysis at all.

"The assumption is that there's never going to be a Nuclear War or even a crisis. Such a thought is pushed off into a world of theoretically possible but largely unimaginable contingencies. It is so remote that politicians don't have to think about them."

"Secondly, analysts are chasing new technologies which they believe will reshape warfighting and are the real subjects to analyze. New artificial intelligence or drone technologies are the focus of attention, rather than the integration of nuclear weapons into the Russian warfighting and political influence arsenal."

"There is very little discussion of nuclear weapons fit into the evolving warfighting approaches and one can miss the key threat – the Russians having a hodgepodge of capabilities ranging from the hybrid, to the traditional conventional, to a new kind of offensive-defensive approach and the blending of nuclear warheads throughout much of the conventional force."

We then discussed ways in which the US and NATO might shape a way ahead with regard to nuclear deterrence.

The first alternative would be that the US could leverage the current bomber force and perhaps ramp up the new bomber and build out the longer-range strike weapons on them, some nuclear but most with conventional warheads. This force could then operate from outside of Europe but affect the battlespace within Europe.

The new bomber given the systems onboard the aircraft and its capacity to be highly integrated with the F-35 provides a wide range of contingencies in which the bomber strike force could be used to strike at key Russian choke points or axis of attack on key allies, notably the new European ones.

This would be especially important if Germany does not accelerate its ability to provide for credible conventional defense in depth.

The second would be to reorganize, restructure and build a new capability for shorter-range battlefield nuclear weapons. This would be a limited arsenal and designed largely to be able to underscore to the Russians that lowering the nuclear threshold which is their current approach makes no sense, because we have a range of options to deny them any combat or political value from a limited nuclear strike in Europe.

The key change agent here is the nuclear equipped F-35, which can operate with its nuclear weapon inside of the airplane and with decent range to strike inside Russia to affect military capabilities of the Russian forces themselves.

Legacy aircraft are much less useful because of their vulnerability in contested airspace whereby the Russians are combining defensive and offensive means for a nuclear tipped tactical aircraft to get through.

This option becomes real again with the F-35 and with the various F-35 users in Europe who could continue in the current nuclear sharing arrangements.

The third is to rebuild the maritime strike force to have lower yield nuclear weapons, again useful in limited contingencies to deny the plausibility for the Russians pursuing a low yield nuclear strike designed to have political effect.

The fourth option is simply to rely on the strategic triad and to do flexible targeting to achieve the deterrent effect; the difficulty with this option is that the use of the strategic triad is part of a much larger piece of deterrence, mutually assured destruction, and may be the equivalent of using a hammer to open an egg.

With the patchwork quilt which NATO Europe is becoming and with the cross-cutting support the authoritarian powers are providing to one another, and with US uncertainties, it is not difficult to envisage a wide variety of crisis scenarios which would rapidly involve the question of how, when and for what purpose the Russians would threaten or use limited nuclear attacks.

Bracken underscored: “If a major country like Germany believed that they have only two choices, nuclear war or capitulation, that is not a choice that is really beneficial for the US or the rest of Europe.

“In Germany, the diplomatic and military issues are so out of sync that we could get into all sorts of crazy scenarios in a crisis which no one has really thought about.

“We need to start doing so.”

In short, for the Russians, limited nuclear use can be considered a key part of any crisis management strategy in Europe and is part of a leveraging strategy to further goals of accelerating the disaggregation of Europe.

Defense.info

In looking at a variety of crisis management strategies for the US and its allies, there is a clear need to avoid the fallacy of nuclear denial and to focus clearly on the role of nuclear deterrence from the NATO side with regard to the return of direct defense in Europe.

The F-35 and the Nuclear Equation

The F-35 has come at a time in which there is a clear need for enhanced precision strike able to operate in such a way as the ability to strike the command and control, and delivery assets of a small nuclear power is of growing strategic significance.

The F-35 can provide a key delivery vehicle for such a mission, notably when connected with a significant offensive and defensive force integrated to the extent that seamless capabilities to strike and defend are integrated into an effective command and control decision making system able to deal with small nuclear powers.

21st century warfare concepts of operations, technology, tactics and training are in evolution and revolution.

The F-35 is at the heart of this change for a very simple reason – it is a revolutionary platform, and when considered in terms of its fleet impact even more so. The F-35, Lightning II, will make combat aviation history with the first of kind sensor fusion cockpit.

The F-35 is essentially an F/A/E-35 that makes it effective in air-to-air, air-to-ground and electronic warfare combined missions. Allied and U.S. combat pilots will evolve and share new tactics and training, and over time this will drive changes that leaders must make for effective command and control to fight future battles.

The impact of an integrated fleet of F-35s with fused internal pilot combat data and also distributed information out, will allow the US and its allies to rethink how to do 21st century air-enabled operations.

Each F-35 will be able to network and direct engagements in 360-degrees of three-dimensional space by offloading tracks to other air/land/sea platforms including UAVs and robots.

As a fleet, the F-35 is an integrated fleet able to share data over great distances via its wave-based communications systems.

And it comes as Western forces are augmenting their ability to network forces and to prepare for the next generation of weapons, and learning how to off board weapons, that is one platform identifying targets and guiding a weapon launched from another platform to the target.

The F-35 is the first software upgradeable tactical jet ever built; and the evolution of the software will be determined by the operational experiences of the air combat force.

And the evolution of the next generation of weapons will be highly interactive with the evolution of F-35 software, either in terms of the integration of weapons onboard the F-35 itself or in terms of its ability to direct strike from other platforms, whether manned or unmanned.

The Offensive-Defensive Enterprise

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 cannot be certain that you are simply putting down a marker.

By shaping a command and control and ISR system (in today's concepts referred to as C5ISR) 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 force as a kill web, the shooters in the enterprise can reach back to each other to enable the entire grid of operation, for either defense or offense.

Integrating Nuclear Weapons into the Offensive-Defensive Enterprise

If one is dealing with combat with a small nuclear power, it is not enough to shape a completely conventional warfare strategy.

It is incumbent on the force planner to integrate nuclear strike into the planning and in providing a means to persuade the adversary that it is simply not credible to use his nuclear weapons as a first strike weapon or a weapon that cannot be neutralized in effective ways by attacks on his C2, delivery assets or storage facilities.

It is about designing from the ground up a credible offensive-defensive capability to effectively defeat a small nuclear power.

It is not about wishful thinking or remaining in the rules of engagement shaped in the first nuclear age; it is entering into an age where the use of nuclear weapons can be imagined once again.

The US Navy refers to the shaping of such distributed capabilities in terms of either "distributed lethality" or the "kill web." The notion is that strike is distributed throughout a web or honeycomb and that strike can be distributed through a self-learning web operating in a high threat environment.

It is crucial as well to design weapons which can be integrated into an offensive-defensive or distributed force where very limited use would be envisaged and only in clear need of doing so. This is why what nuclear warheads, which have historically been called tactical nuclear weapons, combined with advanced delivery technologies becomes a key focus of attention in one's warfighting force.

It is deterrence based on actual warfighting capabilities; not the words of a diplomatic kabuki dance.

Defense.info

The F-35 when married to a small yield nuclear weapon clearly can be a key part of such an evolution. With an ability to incorporate the weapon internal to the aircraft, the package has significantly lower signature as well.

The ability of the F-35 to command situational awareness of 360-degree space and to be able to determine with high precision a target set, and to operate passively while doing so, provides an ideal platform for the delivery of a small yield weapon against appropriate targets as part of an overall campaign against an aggressive small nuclear power.

The redesign of weapons associated with the evolution of the aircraft, and perhaps other delivery vehicles such as hypersonic weapons needs to be part of the effort to deal with second nuclear age powers.

It is about clearly both the evolution of weapons technology as well as delivery technology.

And with the software upgradeable approach of the F-35, there can be an open-ended evolution of the aircraft highly interactive with the evolution of weapons delivery and performance as well.

The Current F-35 and Tactical Nuclear Weapons Approach

The F-35 is a block upgradeable aircraft; in the fourth block in the evolution of the aircraft, currently under design and testing, nuclear weapons delivery will be integrated onto the aircraft.

This design capability will be operational soon but the testing and integration of the aircraft with the initial weapon to be carried on the aircraft will take longer.

Currently, only the F-35A is being considered for nuclear weapons delivery, although it would not take a great deal, to evolve the F-35C, the carrier-based F-35, to have this capability as well.

The former head of the F-35 program, Lt. General Bogdan argued that the F-35 will carry an update B-61 tactical nuclear weapon. The weapon is in development and its progress will determine when the integration actually occurs which then will be followed by testing and certification. According to Bogden: “We don’t see the marrying-up of our capability and that weapon until probably the mid-’20s, but it’s going to happen.”

The Department of Energy is building the weapon itself and the Air Force is building the bomb’s tailkit.

The B-61-12 is a low yield weapon and can be delivered several miles from its target.

But all of that is part of the question of weapons design including the question of evolution beyond the B-61 itself.

Combing an aircraft integrated sensors and target acquisition, and able to so in a passive sensing environment, with a low yield nuclear weapon clearly can introduce a new tool set into an integrated warfighting strategy appropriate to dealing with smaller nuclear powers, or deterring a power like Russia which has threatened the use of tactical nuclear weapons against NATO powers, notably in Northern Europe.

CONCLUSION

The US military has been focused along with core allies in fighting counter-terrorism land wars for more than a decade, which represents a defining generation of combat experience for the joint, and coalition force.

There has been significant combat learning in shaping new approaches to counter-terrorism and land engagements.

But the strategic shift in the global situation, the rise of peer competitors in conventional forces and the return of the salience of nuclear weapons via second nuclear age powers, concepts of operations and technology developed for the land wars are challenged by the emergence of the next phase of warfare, one might characterize as a multi-domain spectrum of conflict.

There are several elements of the new situation which are recasting the spectrum of conflict within which high intensity warfare capabilities are being interwoven into political military realities facing the U.S. and allies when dealing with peer competitors.

The Nuclear Dimension

Both Russia and China are nuclear powers, and certainly in the Russian case modernization of their nuclear arsenal is providing new capabilities within their operational force which could allow for earlier use.

And the North Korean nuclear efforts along with anticipated other second nuclear powers, perhaps Iran, have posed fundamental considerations about where exactly to find the nuclear threshold in potential global conflict.

Put in other terms, engagements with second nuclear age powers or with peer competitors will always have a nuclear dimension, either in terms of deterrence or engagement.

The return of Herman Kahn and thinking the unthinkable is upon us, whether we want it or not.

As Danny Lam has put it:

A nuclear device need not necessarily be a WMD with a more up to date definition used by the CCA that do not define nuclear as WMD by default.

Prevention of mass destruction & casualties may require the nuclear threshold to be crossed in a judicious and tightly controlled manner when there is no other feasible method.

It does not follow that crossing the nuclear threshold in such a manner will automatically lead to wholesale nuclear war.

There is no reason why an escalatory latter has to exist for a given adversary or for it to be operative.

On the contrary, nuclear explosives may be the only practical way to prevent war caused by indiscriminate use of nuclear weapons in dangerous hands like North Korea.

Technology and doctrine have evolved since nuclear weapons were used last in 1945 and WMD taboos became institutionalized in international law.

The laws are now obsolete.

The nuclear threshold as it was formulated in the 20th century may be no less an obsolete concept than the Pope Innocent III's prohibition on the use of crossbows on Christians.

Peer Competitors and High-End Conventional Capabilities in the Service of Global Engagement

The nature of the threat facing the liberal democracies was well put by a senior Finnish official: "The timeline for early warning is shorter; the threshold for the use of force is lower."

Defense.info

What is unfolding is that capabilities traditionally associated with high end warfare are being drawn upon for lower threshold conflicts, designed to achieve political effect without firing a shot.

Higher end capabilities being developed by China are Russia are becoming tools to achieve political-military objectives throughout the diplomatic engagement spectrum.

This means that not only do the liberal democracies need to shape more effective higher end capabilities but they need to learn how to use force packages which are making up a higher end, higher tempo or higher intensity capability as part of a range of both military operations but proactive engagement to shape peer adversary behavior.

One is buying fifth generation aircraft not simply to prepare for an all-out war to defend the democracies, but to provide tools for governments to defend their interests throughout the spectrum of warfare and co-associated diplomatic activity as well.

It is about using military force in ways appropriate to the political mission.

We have argued that the F-35 global fleet provides for new capabilities appropriate to the strategic shift. We have argued as well that it is part of a transition, not simply an end in itself. Shaping a kill web force which is certainly enabled by the F-35 fleet is the core forces of force structure transformation for prevailing in crisis management with peer competitors.

The multi-domain capabilities of the aircraft means that a small footprint can bring diversified lethality to the fight.

An F-35 squadron can carry inherent within it an electronic attack force, a missile defense tracking capability, a mapping capability for the ground forces, ISR and C2 capabilities for the deployed force and do so in a compact deployment package.

In addition, an F-35 fleet can empower Air Defense Artillery (ADA), whether Aegis afloat or Patriots and THAAD Batteries, the concept of establishing air dominance is moving in a synergistic direction.

An F-35 EW capability along with its AA and AG capability will introduce innovate tactics in the SEAD mission.

Concurrently, the F-35 will empower U.S. and Allied ADA situational awareness. The current engagement of the IDF employment of their Irion Dome in conjunction with aviation attacks is a demonstration of this type of emerging partnership being forged in battle.

To get a similar capability with a legacy force and a legacy approach into the area of Interest would require a diversified and complex aerial fleet, whose very size would create a political statement, which one might really not want to make.

With an F-35 enabled insertion force, a smaller force with significant lethality and flexibility could be deployed until it is no longer needed for it is about air-enabled ground forces. And the Marines are demonstrating that a tiltrotor enabled assault force with top cover from a 360-degree operational F-35 fleet, whether USMC, USN, USAF or allied can allow for the kind of flexibility necessary for 21st century warfare and operational realities.

F-35s, F-22s supported by integrated by a strong missile capability, both to defend and to attack, but integrated by a viable distributed C2 system is both part of high-end warfare but what is needed to deal with lower ends of conflict as well as the power competitors shift the spectrum of conflict where mix and match

of higher end, lower end and capabilities in between are conjoined into a force package to support political objectives.

The US and allied militaries face challenges to get to the point where they have operational multi-mission, multi-domain distributed C2 force packages fully available to decision makers.

But the acquisition of new systems, new training approaches, redesign of C2 systems, focusing upon abilities to the various services to operate more effectively in an integrated battlespace are underway.

We will deal with the training piece in our next report.

The Missing Factor: Are Civilian Strategists and Politicians Up to the Challenge in the Liberal Democracies?

What is more problematical is whether the strategic elites in the liberal democracies and notably their political masters are ready for the shift in the global game away from diplomacy as a hermetically sealed art craft.

The non-liberal powers are clearly leveraging new military capabilities to support their global diplomacy to try to get outcomes and advantages that enhance their position and interests.

The systems there are building and deploying are clearly recognized by the Western militaries as requiring a response; less recognized is how the spectrum of conflict is shifting in terms of using higher end capabilities for normal diplomatic gains.

The decade ahead is bound to be interesting.

To be blunt, the distinction which Joe Nye suggested between hard and soft power is being changed by the military revolution.

21st Century military systems are really about hard power redesigned to be more useful in supporting political objectives, which if one wants to call that soft power then I am not sure the distinction has meaning.