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# ISR in the Shaping of the Integrated Distributed Force

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# Shaping the C2/ISR Infrastructure for an Integrated Distributed Force

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By Robbin Laird

Over the past thirty years, the United States and its core allies have gone through three phases of innovation with regard to conventional forces.

The first was air-land battle designed for the European theater and executed in the 1991 Iraqi War.

The second was the innovations associated with the land wars and the joint force support for COIN operations.

The third which is unfolding now is designed to deal with 21st century high intensity operations which can be conducted by peer competitors.

**This new phase might be called shaping, exercising and building an integrated distributed force.**

This entails interactive technological, force structure and geographical deployment dynamics. We have argued that a new basing structure combined with a capability to deploy and operate an integrated distributed force is at the heart of the strategic shift, and not only in the Pacific.

This is a key part of the effort to shape a full spectrum crisis management capability whose con-ops is shaped to deal with adversary operations within what some call the "gray zone" or within the "hybrid warfare" area.

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."

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 and 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.

In today's world, this is what full spectrum crisis management is all about. It is not simply about escalation ladders; it is about the capability to operate tailored task forces within a crisis setting – to dominate and prevail within a diversity of crises which might not be located on what one might consider an escalation ladder.

This means that a core legacy from the land wars and COIN efforts needs to be jettisoned if we are to succeed – namely, the OODLA loop. The OODA loop is changing with the new technologies which allow distributed operators to become empowered to decide in the tactical decision-making situation.

But the legacy approach to hierarchical approval to distributed decisions simply will take away the advantages of the new distributed approach and give the advantage to our authoritarian adversaries.

What is changing is that the force we are shaping to operate in the littorals has expansive reach beyond the presence force in the littorals themselves. If you are not present; you are not present. We have to start by having enough platforms to be able to operate in areas of interest.

**But what changes with the integrated distributed ops approach is what a presence force can now mean.**

Historically, a presence force is about what is organically included within that presence force; now we are looking at reach or scalability of force. We are looking at economy of force whereby what is operating directly in the area of interest is part of distributed force.

The presence force however small needs to be well integrated but not just in terms of itself but its ability to operate via C2 or ISR connectors to an enhanced capability. But that enhanced capability needs to be deployed in order to be tailorable to the presence force and to provide enhanced lethality and effectiveness appropriate to the political action needed to be taken.

**This rests really on a significant rework of C2 in order for a distributed force to have the flexibility to operate not just within a limited geographical area but to expand its ability to operate by reaching beyond the geographical boundaries of what the organic presence force is capable of doing by itself.**

This requires multi-domain SA. This is not about the intelligence community running its space- based assets and developing reports. This is about looking for the coming confrontation which could trigger a crisis and the SA capabilities airborne, at sea and on the ground that would provide the most usable SA monitoring. This is not "actionable intelligence."

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

This also requires tailored force packaging to take advantage of what the new military technologies and platforms can 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.

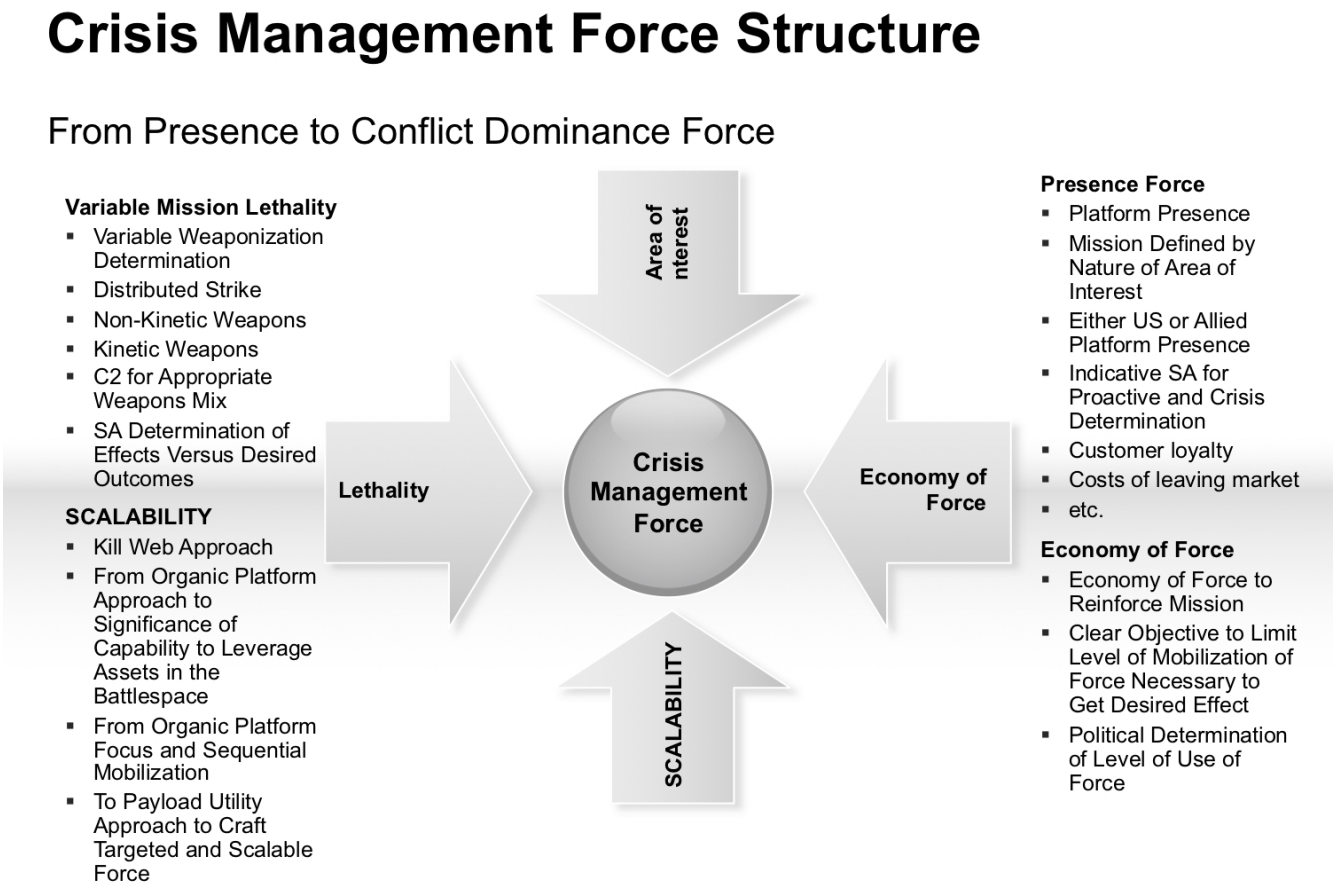
**This is not classic deterrence – it is about pre-crisis and crisis engagement.**

The force we are building will have five key 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.

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.




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.

**For this approach to work, there is a clear need for a different kind of C2 and ISR infrastructure to enable the shift in concepts of operations.**

Indeed, when describing C2 and ISR or various mutations like C4ISR, the early notions of C2 and ISR seen in both air-land battle and in joint support to the land wars, tend to be extended into the discussions of the C2 and ISR infrastructure for the kill web or for force building of the integrated distributed force.

But the technology associated with C2 and ISR has changed significantly throughout this thirty year period, and the technology to shape a very different kind of C2 and ISR infrastructure is at hand to build enablement for distributed operations.

# The Changing Role of ISR in the Pacific

08/16/2020

By Defense.info

Recently, a senior US Navy Admiral noted that "The next war will be won or lost by the purple shirts. The next fight is an ISR fight."

This is in part why the US Navy has established a Maritime ISR or MISR Weapons School at NAWDC or the Naval Aviation Warfighting Center.

The focus traditionally has been on the right side of the kill chain, namely, target and engage.

What is happening is an increased focus in the joint arena on the left side of the kill chain, namely, find, fix, and track and assess.

**Gaining ISR advantages, ensuring that one has effective proactive ISR prior to an engagement, and an ability to have the right information, go to the right time and for timely actions is crucial.**

The shift to priority on the left side of the kill chain is occurring as ISR assets become more widely distributed in the force, and has led to the concept of operating form a kill web perspective, rather than a linear kill chain executed by forces operating sequentially.

The kill web perspective is founded on a core combat platform or combat group understanding what adjacent forces, whether Navy, joint US or coalition, can be leveraged for that platform or force element's enhanced reach and combat effectiveness or alternatively, determining what your platform or team can contribute to their combat needs.

**This is clearly not just an American perspective but one shared by a number of U.S. allies, no more so than Australia.**

In the conclusion of his series of articles on defending south of Australia's first island chain, Brian Weston highlighted the importance of ISR for Australia to more effectively provide for capabilities to defend itself against threats operating in the Pacific.

*Intelligence, surveillance and reconnaissance (ISR) capabilities are the foundation of national security.*

*But in the past, Australian defence policies have used ISR in the strategic context of 'Warning Time' rather than in an operational or tactical context.*

*In this strategic context, the role of ISR is to warn of the emergence of threats as they emerge so that they are recognised and responded to by a corresponding upgrade in national defence capability.*

*Today, there seems little doubt Australia is in Warning Time.*

*Indeed, that realisation appears to have come a little late with some 2016 IIP defence capabilities not scheduled to begin to appear until the mid-2030s. Capabilities that will not begin to materialise until the mid-2030s and later, will be of little use in 2025.*

*Fortunately, many of the ISR capabilities that Australia has prioritised also have immense value in an operational theatre.*

*These include the acquisition of six MQ-4C Triton unmanned surveillance systems and 12 P-8A Poseidon manned aircraft, both recommended in the 2016 IIP.*

*The IIP also foreshadowed an increase to 15 P-8A, which at a mission availability rate of 75%, translates into 11.25 "mission-available" P-8A. The MQ-4C and P-8A capabilities are complementary, and when combined with the four long-range electronic warfare support aircraft based on the Gulfstream G550, the Jindalee OTH Radar Network (JORN), and coalition Australia-US ISR capabilities, Australia will possess a modest but impressive operational ISR capability.*

***But is this ISR capability enough to sustain ongoing operations out to Australia's First Island Chain?***

***And, is it possible for these ISR capabilities to sustain ongoing operations, simultaneously, in two areas of operations such as in the North Coral Sea and off the North West Shelf?***

*Noting the US Navy allocates five MQ-4C to an operational node from which to sustain 24/7 ISR operations, the Australia MQ-4C capability will support only one node of 24/7 unmanned ISR operations. Whether this is adequate is debatable given long-range ISR operations are asset intensive as illustrated by the heavy AP-3C commitment in the mid-1990s search and rescue operations for round-the-world yacht racers; their heavy tasking in operations against illegal Patagonian Toothfish fishing boats; and in the search for MH370.*

*So, getting the MQ-4C and P-8A operational fleet sizing right and balanced, will be critical to the efficiency and effectiveness of the operational ISR capability.*

*But one positive from the introduction of the unmanned MQ-4C is that it relieves the manned P-8A of most of the long duration and repetitious surveillance activity, freeing the P-8A armed with mines, torpedoes and anti-ship missiles (ASM) to focus on the anti-submarine and anti-surface roles.*

***Given the changing maritime power balance in the Indo-Pacific, this refocus of P-8A operations is timely and, arguably, provides justification for the early acquisition of the three additional P-8A foreshadowed in the IIP.***

*The changing maritime power balance in the Indo-Pacific has also stimulated the development of new, technologically advanced, US ASM capabilities (noting recent US reports of a possible Foreign Military Sale of AGM-158C LRASM to Australia for carriage on F/A-18F Super Hornet). And with the*

*AGM-158C likely to be cleared for carriage by the P-8A in the mid-2020s, there is a strong case to arm RAAF P-8As with the AGM-158C.*

*With both the P-8A and F/A-18F armed with the stealthy, heavyweight, sophisticated and long-range AGM-158C, the ADF will possess a strong deterrent to threatening foreign naval incursions south of Australia's First Island Chain.*

*Air dominance is the prime role of the F-35A, although the in-theatre distances will make F-35A operations generally reliant on AAR support. The F-35A with its stealth, AIM-120D AMRAAM, long-range targeting ability and networked operations is a potent air dominance capability. As 2025 approaches, the operational capabilities of the F-35A will be further enhanced by the Block 4 upgrades which, apart from system and weapons upgrades, could include the integration of the Joint Strike Missile (JSM) or another ASM, and the possible integration of the follow-on AIM-260 JATM long-range air-to-air missile.*

*The air force operates six E-7A Wedgetail, Airborne Early Warning and Control (AEW&C) aircraft; a world class, critical enabling capability for both air and naval operations.*

*But a fleet of six aircraft translates into only 4.5 mission-available E-7A. But while the 2016 IIP includes a significant upgrade to the AEW&C systems, it's failure to increase the AEW&C fleet to eight aircraft (which would provide six mission-available E7-A) leaves the ADF deficient in the key operational and tactical co-ordination and control nodes, critical to mission success.*

*The E-7A is also reliant on AAR support. A mission of about 10 hours, for a task at 1,500 km distance, involves five hours in transit and five hours on-station. Therefore, to sustain a 24/7 on-station E-7A presence, 4.8 missions must be tasked – not achievable from the current fleet of six aircraft.*

*But E-7A on-station time can be achieved with AAR support.*

*By increasing mission duration to 15 hours, which also increases E-7A on-station time to 10 hours, AAR realises a 100% increase in E-7A on-station time. With AAR support, only 2.4 missions are needed to sustain a 24/7 on-station E-7A presence.*

*This example also demonstrates that enabling AAR generally flows 'straight to the bottom line' of increased on-station presence. AAR support confers similar dramatic increases in on-station presence to the P-8A, EA-18G, F/A-18F and F-35A.*

*The 2016 IIP expanded the MRTT capability to seven aircraft and foreshadowed a further increase to two aircraft, nominally to support P-8A operations. But even a fleet of nine MRTT aircraft – with 6.75 mission-available MRTT – is insufficient to provide the necessary AAR enabling capability to conduct credible air operations, at task force level, in our region.*

*In short, this deficiency in AAR support puts at risk the operational effectiveness of an otherwise potent Australian air combat and sea denial capability upon which successful Australian air and naval operations must be based.*

*In conclusion, the 2016 IIP has provided a framework of complimentary air capabilities that, in 2025, and with some augmentation, will pose a formidable challenge to any hostile air and naval incursion south of Australia's First Island Chain.*

*But the IIP has not recognised the criticality of the E-7A AEW&C capability to successful air and naval operations in the theatre, and of the necessity of increasing enabling AAR capability to support the range of likely concurrent air and naval activities.*

**Brian Weston is a Board Member of the Sir Richard Williams Foundation. He served tours in Defence's Force Development Analysis Division and the HQADF Force Structure Development Planning Branch.**

https://www.williamsfoundation.org.au/post/on-target-defending-south-of-australia-s-first-island-chain-part-3

# Exploiting the Integrated ISR Systems of the Future

07/18/2020
By Jacob Simpson

*Monitoring the mission in real-time, the commander scrutinises the all-source intelligence picture for signs that the unmanned strike package had been detected.*

*A warning suddenly appears on the display, indicating a previously unknown SAM system has switched on its radar.*

*The element of surprise will be ruined if action is not taken immediately.*

*The commander's AI system launches a query into a massive dataset of real-time enemy location data. An alternative, optimised flight-path is automatically generated, enabling the unmanned aircraft to swiftly change course.*

*No statistically significant changes in the enemy's posture is registered by the AI.*

*The strike mission continues undetected through the complex air defence system.*

When it comes to intelligence, surveillance and reconnaissance (ISR) systems, the exploitation of big data and AI for situational awareness is described as revolutionary for command and control (C2).[1] Future ISR systems, also known as the sensing grid, plan to use AI to autonomously consolidate all-source information into a single operational picture.[2]

This all-source, fuzed picture is then used in conjunction with a command grid; a sophisticated AI to rapidly generate enemy courses of action (COA) for commanders and recommend responses.[3]

The strategy behind this is clear; if realised, the sensing grid will enable a C2 system to observe, orient, decide and act (OODA) at machine-speeds, improving the chances of gaining a decisive advantage over the enemy.

All major powers, including potential adversaries, have development programs aimed at achieving a sensing grid.[4] If the Australian Defence Force (ADF) is to be prepared for conflict against adversaries with a sensing grid, it will be required to develop new capabilities in order to deny the enemy to achieve a machine-speed OODA loop.

A counter-AI strategy will enable the ADF to achieve this, significantly lowering the effectiveness of the enemy C2 by exploiting the vulnerabilities of AI.

**How should the ADF develop these counter-AI capabilities, and what are the vulnerabilities of the sensing grid?**

Very little has been written about the potential vulnerabilities of AI use within C2 and ISR systems. Most commentators state that AI will herald an unparalleled ability to increase OODA loop speed and open new innovative approaches to warfare for commanders.

However, sensing grid systems are not without weakness, nor are they impervious to deception or surprise. AI will not, in the foreseeable future, achieve the 'general intelligence' of the human mind, and will therefore not understand the context behind an ISR picture it is observing. Instead, machines will speedily calculate a large number of statistical predictions using a system of complex machine learning (ML) algorithms – a process whereby large data sets are mined for patterns.

The system will have been specifically trained to detect anomalies from adversary military systems and to base its predictions solely on probability from the data it has been trained on.

Therefore, by focusing intelligence efforts on understanding and manipulating the adversaries algorithm design or training data, the ADF can develop capabilities for targeting specific AI vulnerabilities.

To appreciate the potential weaknesses of the sensing grid, we will need to understand the vulnerabilities of its supporting AI. Put simply, AI is the 'ability of machines to perform tasks that normally require human intelligence.'[5]

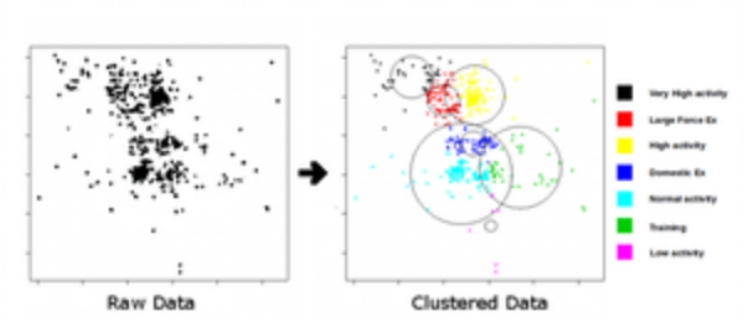
This is accomplished through the use of algorithms, which in the context of AI, is an attempt to translate human thought processes into computer code. This code outlines the rules that the AI must follow; often a complex system of binary if-then logic.

For decades, AI coding rules were built manually, such as DEEP BLUE, where AI designers leveraged the expertise of chess masters to code the AI.[6] This method has limitations, as some tasks are too complex to be coded manually. However, significant advancements in big data and computational power have resulted in ML algorithms becoming viable for more complex human tasks.[7]

Unlike traditional algorithms, AI built with ML has code that is learned from datasets; this approach works well if data is available. The problem for the sensing grid AI, however, is that much of the data will need to be simulated; no real data exists for the wars of the future.

Therefore, the use of AI does not remove the human factor.

**Regardless of which AI used, algorithm rules within an adversary sensing grid will be designed by humans and maintain the vulnerabilities of traditional ISR systems; reflecting the beliefs, culture and biases of those that create them.**



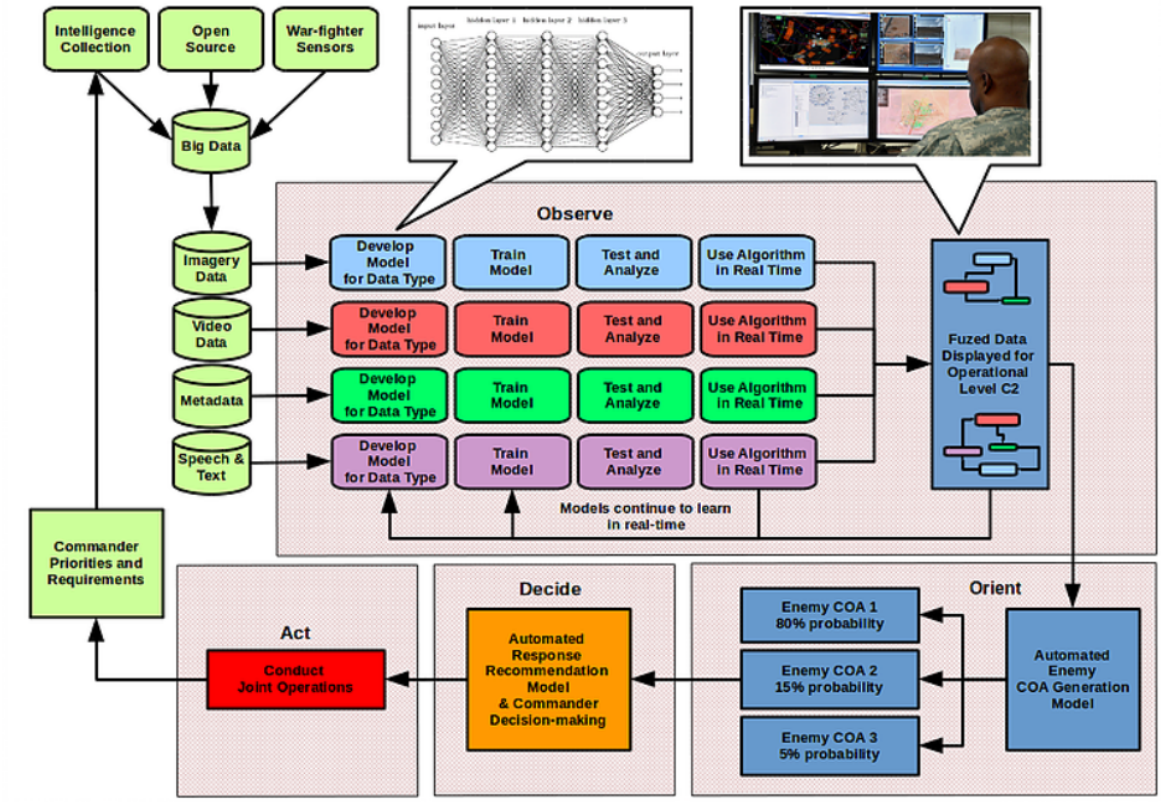




Figure 1: The Sensing Grid OODA Loop. [8]

By targeting the vulnerabilities of AI design, the ADF can increase friction into the sensing grid system.

Figure 1 depicts a sensing grid at work.

The AI will not be a single entity, but will be a complex system of ML algorithms designed to predict enemy behaviour through automated analyses of indicators and warnings (I&W).[9] Starting from the left, the diagram depicts a collection of all-source data being funnelled into a format-specific ML

algorithm (image, text, signal, etc.) for analysis. Each algorithm will continuously learn and update itself using real-time data streaming to minimise prediction error.

The output from each algorithm is then fused via another ML algorithm to create a single ISR picture for the commander's use.

This advanced AI system will then attempt to generate predictions about the enemy's COA using the integrated ISR picture, allowing for a final ML algorithm to recommend a response to the commander for action.[10]

This means that if one phase in the OODA loop contains inaccuracies, then so too will each phase thereafter.

**Which phase then is the most vulnerable?**

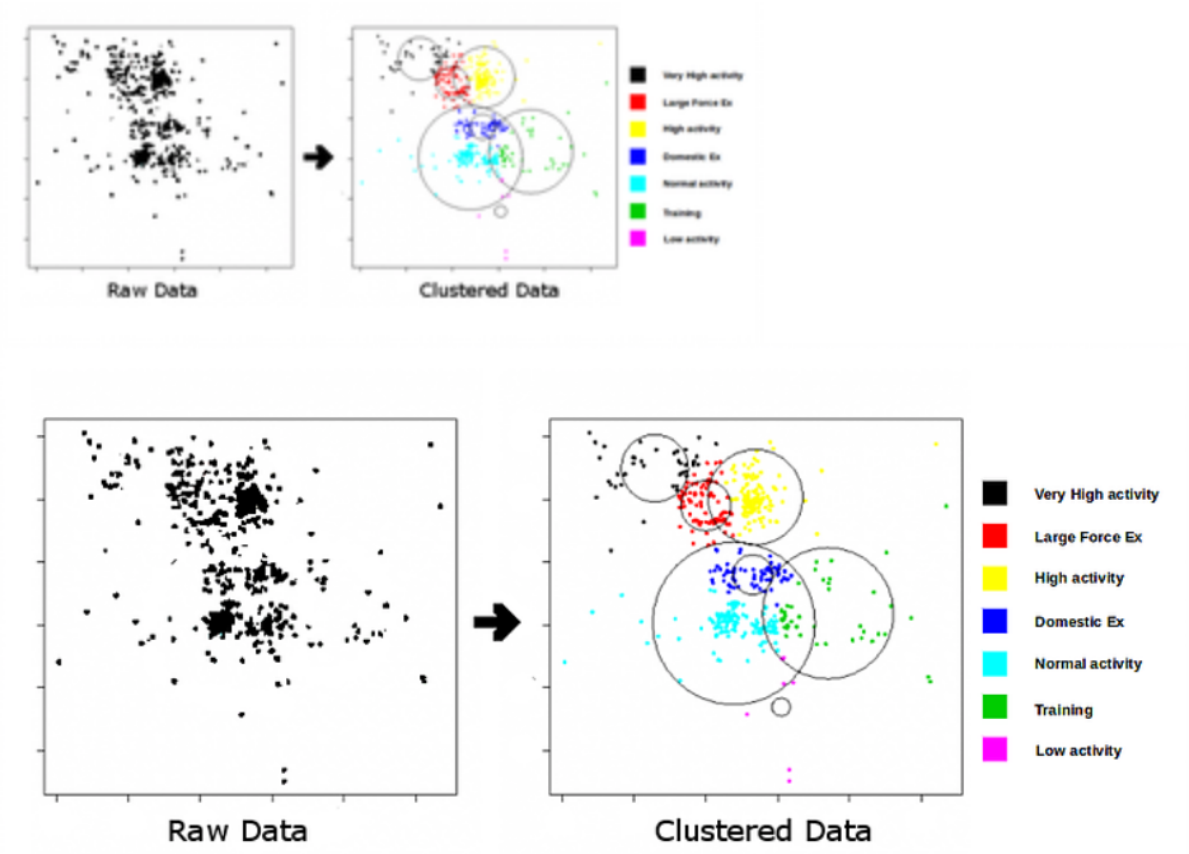



Figure 2: The results from a neural network; data is clustered to render predictions and spot outliers.[11]

**The critical vulnerability in the sensing grid is the orient phase of the OODA loop.**

Figure 2 depicts the result of an all-source fused data set that trained a ML algorithm for the orient phase. This particular example is a simplified output of a semi-supervised neural network algorithm designed to classify behaviour and detect any changes in activity. The algorithm clusters real-time data according to predefined attributes known as 'features', such as the number of enemy flights,

movements of naval vessels, detected radar signals, etc. It is the patterns established between the features that provide the algorithm with the information needed to accurately predict adversary actions.[12]

Each datum is assigned a probability that marks it as belonging to a specific cluster, thus flagging it for a specific action if required. For a commander observing an operating area, for example, the algorithm will autonomously display flights that constitute a 'normal behaviour' cluster, while identifying a long-range patrol elsewhere and flagging it as an outlier requiring attention.

By preventing the orient phase ML algorithm from accurately clustering data, it may allow deception or surprise against a sensing grid system; sowing confusion and distrust in the AI recommendations to the commander.

The question then becomes: *how does the ADF ensure inaccurate data is being utilised by the enemy AI?*To answer this, we need to explore adversarial ML techniques such as 'data poisoning', 'evasion', and 'model corruption'. All three can be used as counter-AI tactics by the ADF for exploiting the enemies sensing grid.

## Counter-AI Tactic: Data Poisoning

A critical weakness of the sensing grid AI is that it is susceptible to inaccurate predictions during the initial stages of a conflict. That is because the AI can only be as accurate as the parameters and data it was assigned and trained with prior to going live. During the initial research and development stage of a sensing grid, AI designers select the ML models, specify which features to be used for predictions, and then train it accordingly.[13] Since the actual *real* data for all possible enemy courses of action (COA) does not exist, the datasets used for training the sensing grid are likely to be synthetic – i.e. 'simulated'. These simulated models will be based primarily on intelligence assessments and beliefs about the enemy.

Therefore, if the training dataset or simulation fails to accurately reflect an adversary's COA during the initial stages of conflict, the AI's predictions will likely be inaccurate until it updates and adjusts itself to new adversary behaviour.[14]

This delay in accuracy may result in less optimal responses from the AI during the critical initial stages of a conflict.

Information warfare's objective of targeting the beliefs and assumptions of the adversary will remain, but in this context the end goal changes to the denial of accurate data for ML training.

Therefore, to ensure a slowed OODA loop at the start of conflict, the ADF should focus on encouraging a potential adversary to train its sensing grid on inaccurate data. This will require traditional counterintelligence and strategic deception efforts to shape an adversaries beliefs; essentially encouraging them to poison their own data.

Another option, would be through forced data poisoning with cyber-attacks, whereby false data is embedded into an AI's training dataset to weaken its predictive accuracy.

Thus generating inaccurate predictions, even if the enemy beliefs and intelligence assessments are accurate.

## Counter-AI Tactic: Evasion and Model Corruption

Data poisoning may grant an initial advantage, but it will not last long; the sensing grid system will learn from its mistakes and adjust to ADF actions. During conflict, knowledge of the ML's orient phase algorithm could render the system open to outside manipulation and be more exploitable than a human.

By identifying the parameters responsible for triggering an AI's change detector, one could develop counter-AI tactics to conduct operations beneath the classification threshold of *threatening output*. For example, we may discover that the number of RAAF air mobility fights per day has been designated as afeature within an enemy's ML algorithm, with sudden upward trends in activity accorded a high probability of signalling *attack preparation*.

Such intelligence could be used to strategically conduct air mobility flights below the known classification threshold to effectively circumvent the opponent's I&W system.

These tactics could be tested against a simulated enemy sensing gird if we are able to acquire sufficient knowledge of how theirs was built.

Alternatively, if the AI is set up to continuously learn from real-time data streaming, we could affect false patterns of life, or lower its sensitivity to certain features, thereby corrupting an adversary's algorithm into classifying abnormal behaviour as normal. This becomes especially important as a form of long-term preparation for critical operations, examples of which are already occurring in cyberspace today.

AI is used for cyber-defence to detect and prevent attacks against security systems by differentiating between normal and anomalous patterns of behaviour within the network. The challenge is when cyber attackers know how cyber defence works, resulting in attacks designed to manipulate the algorithm's threshold of detection.

These include 'slow attacks' in which an intruder gradually inserts their presence into a targeted network over time, thereby corrupting the security ML algorithm into perceiving its presence as normal.15 Such deceptive techniques can be implemented against a sensing grid system that has grown overly reliantupon its AI.

The sensing grid's reliance on AI creates a vulnerability that can be exploited through a counter-AI strategy. Encouraging and enabling the enemy's loss of trust in its own ISR system serves as the central goal for a counter-AI strategy.

A single successful operation in deception may be all that is required to permanently impair an adversary's trust in its AI predictions.

With system outputs and predictive accuracy plagued by second-guessing, the adversary's OODA loop slows down to a degree that eventuates the system's under-utilisation, thereby providing the ADF with the advantage.

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# MISR, MINOTAUR and Training for the Maritime Kill Web

07/31/2020

When I visited San Diego earlier this year, in my discussion with VADM Miller, he highlighted the importance of the coming of MISR to the fleet.

MISR officers are trained as ISR subject matter experts to operate at the fleet or CSG level and to work the sensor fusion for the integratable CVW. According to the Air Boss: "I think of MISR as additive, not lessening of TOPGUN, but instead akin to a new phase which builds upon our historical experience in the development of TOPGUN in the first place."

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

And in my discussions with Rear Admiral Peter Garvin, the head of the Maritime Patrol Enterprise, he highlighted the importance of MINOTAUR to the force as well.

According to Rear Admiral Garvin: "The Maritime Patrol and Reconnaissance aviator of the future will be well versed in the synergy inherent in both manned and unmanned platforms."

"The unblinking stare of a Triton enhances the Fleet Commander's MDA and understanding of an adversary's pattern-of-life by observing their movements in the optical and electromagnetic spectrum."

"Moreover, Triton serves as a force multiplier and enabler for the P-8. Early in Triton program development, we embraced manned and unmanned teaming and saw it as a way to expand our reach and effectiveness in the maritime domain."

"One key software capability which empowers integration is Minotaur."

"The Minotaur Track Management and Mission Management system was developed in conjunction with the Johns Hopkins University Applied Physics Laboratory. Minotaur was designed to integrate sensors and data into a comprehensive picture which allows multiple aircraft and vessels to share networked information."

"It is basically a data fusion engine and like many software capabilities these days, doesn't physically have to be present on a platform to be of use."

"These capabilities ride on a Minotaur web where, if you are on the right network, you can access data from whatever terminal you happen to be on.

Recently, I had the chance to talk with CDR Pete "Two Times" Salvaggio, Naval Aviation Warfighting Development Center (NAWDC), Maritime ISR (MISR) Weapons School, Department Head (DH), MISR & EP-3E Weapons and Tactics Instructor (WTI).

The career of this officer spans the period prior to MISR, the creation of MISR and the maturation of the MISR and Minotaur initiatives, which are laying down the foundation for creating the 6th generation force alluded to earlier in the article.

What CDR Salvaggio described was a very creative and interactive process in which the Navy has been engaged with the other services and coalition partners in both reshaping and rethinking how the force operates and can operate going forward with the C2/ISR revolution underway.

He was trained as an EP-3 operator, and when he worked for then-Captain Garvin who at the time was CPRW-10, the goal was to cross link what EP-3s could do with the rest of the Maritime Patrol and Reconnaissance Force (MPRF), which at the time included P-3s, BAMS-D RQ-4s, and Tactical Operations Centers (TOCs), to prepare the grounds for the coming of the P-8/Triton dyad.

This initiative was combined with experiences in the land wars of Iraq and Afghanistan to lay the foundation for MISR.

What Two Times described was his experience in the Middle East working with the CENTAF Combined Air Operations Center (CAOC) as part of the USMC's 3rd MEF operations in RC-South West as the EP-3E Detachment Officer in Charge (OIC).

Lessons from those operations on how the Marines were dynamically integrating ISR feeds into the ground maneuver element set the initial foundation.

With an ISR officer on the ground responsible for shaping the knowledge base for informing ground maneuver, it was obvious to Two Times and his senior officers that the Navy needed just such an approach in the years to come.

We have argued that with regard to the Land Wars, the challenge was "to harvest the best and leave the rest," and clearly learning from the successes of ISR integration into 3rd MEF's operations, the Marines provided a lead into a major shift in the Navy which began to embrace the concept of deploying ISR integrators within the fleet to assist in shaping the knowledge base for the distributed maritime force.

MISR prides itself in being both platform and sensor agnostic, along with employing an effects-based tasking and tactics approach that allows for shaping the ISR domain knowledge which a task force or fleet needs to be fully combat effective.

What is most impressive is that CDR Salvaggio has been present at the creation and is a key part of shaping the way ahead in a time of significant change in what the fleet is being asked to do in both a joint and coalition operational environment.

And NAWDC clearly reflects and embodies this change.

Over the past six years, NAWDC has gone from traditional CSG integration, to embedding the surface and subsurface weapons schools, to evolving a new approach to working the platform training side of NAWDC to embrace the shift to the integratable air wing, to standing up two new weapons schools which are kill web oriented, not platform oriented.

The first school was highlighted in the interview with CDR Joseph "Smokin' Joe" Fraser, head of the Information Warfare Directorate, which has been designated the executive agent for targeting for the United States Navy.

The second school is the MISR weapons school. And to be clear, these are not simply layering on top of platform training schools; they are part of the cross-training which goes on within NAWDC.

But not just NAWDC, for working with the USAF and the USMC, as well as with our closest coalition partners, is crucial for shaping a way ahead.

CDR Salvaggio underscored that one of his responsibilities at NAWDC is working the only ISR exercise conducted in the United States, one which includes those allies.

The exercise is called RESOLUTE HUNTER and is jointly sponsored by NAWDC and the USAF's Air Combat Command. Notably, the Marines are becoming involved in RESOLUTE HUNTER as well. The trajectory for working the ISR/C2 enablement of the integrated distributed force is clearly evident.

**Editors' Note: This article was published by the Air National Guard on November 1, 2019 about the Resolute Hunter exercise.**

High Rollers Fly with Navy during Resolute Hunter Exercise

By Senior Master Sgt. Paula Macomber, 152 Airlift Wing, Nov. 1, 2019

FALLON, Nev. – The 192nd Airlift Squadron participated in Exercise Resolute Hunter joint training at the Naval Air Station Fallon Range Training Complex Oct. 21-25. The Naval Air Station Fallon and Naval Aviation Warfighting Development Center are the Navy's premier Weapon Tactics Instructor schools.

"This range complex has some of the most advanced enemy threat emitters in the world," said Maj. Kyle Carraher, a pilot with the 192nd Airlift Squadron out of Reno, "and the training is as realistic as you can get. We want to bolster our relationship with the entities in Fallon so we can train smarter and more effectively. This is an extraordinary opportunity to support their objectives while meeting our internal training requirements."

The training complex encompasses NAS Fallon and nearby range training areas, Bureau of Land Management rights-of-way and 13,000 square miles of special use airspace.

This exercise enhances the joint cooperation among many entities, not limited to the Air National Guard and the Navy.

"The relationship with NAS Fallon really benefits everyone connected to these airplanes on base, Carraher said. "I say this because future operations rely on joint interoperability, and joint interoperability is only going to happen if we train together. The relationships we build result with the other branches of services increased ability to support the joint fight.

The 192nd logged 25.3 flying hours, accomplished 614 training events and more than 25 radar threat reactions and dropped four low-cost low altitude bundles. They also flew three mission commander/lead upgrade rides, two pilot-checkout-course upgrade flights and a one-time no-notice pilot mission check ride. They were also able to execute a C-130H and C-130J interfly with the California Air National Guard out of Channel Islands, California.

"Channel Islands is our sister unit in the modular airborne firefighting system mission due to their close proximity in response to wildland fires," said Carraher. "We have a great working relationship with their unit, and C-130H and C-130J interfly is an invaluable skill to develop. The airframes share many similarities, but the intricacies of flying in formation are challenging."

There were 4,500 people supporting the exercise with 12 different airframes.

“It really boils down to communication, Carraher said. “Simple things like ‘shorthand’ or ‘lingo’ between services does not always translate to clear communication, and this is exactly why we train together, so we can identify impediments to accomplishing the mission in training so we can execute the mission in the real world.

# The Coming of MISR to the Fleet: The Perspective of the First Deployed MISR Officer

08/05/2020

By Robbin Laird

Earlier this year, in a visit with Vice Admiral Miller, the US Navy’s Air Boss, I was introduced to the coming of MISR, or the Maritime ISR Officer.

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

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

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

I followed this introduction to MISR up over the past two months with discussions with officers from the Naval Aviation Warfighting Center or NAWDC with regard to how the focus on training for the integrateable air wing was shaping the way ahead. Two new warfighting training courses reflect the change.

The first is the information warfare training course which is focused on dynamic targeting.

And the second is MISR which is focused on providing the connective tissue between the operational platforms working as a integrated force to deliver the dynamic targeting effect.

The MISR effort is clearly a work in progress, but is laying the foundation for what is clearly ongoing innovations with regard to connectivity among platforms and how C2 is delivered at the tactical edge and aggregated into strategic decision making as well.

MISR is both a capability here now, but a dynamic driver for how to change the force as new ISR capabilities are added to the force, such as Triton and the upcoming revolutions in maritime remotes.

If one does not learn how to change the culture of how ISR is used and C2 redesigned then adding new ISR rich platforms or new ISR capabilities will not have the desired combat effect.

From this perspective MISR is an innovation, a new foundational element, and a plank holder in the strategic shift for force structure integratability, notably to deliver the desired political and combat effects necessary to prevail in the new strategic environment of engaging in full spectrum crisis management and escalation control and dominance.

Recently, I interviewed CDR Pete "Two Times" Salvaggio, Naval Aviation Warfighting Development Center (NAWDC), Maritime ISR (MISR) Weapons School, Department Head (DH), MISR & EP-3E Weapons and Tactics Instructor (WTI).

The career of this officer spans the period prior to MISR, the creation of MISR and the maturation of the MISR and Minotaur initiatives.

The officers involved in the MISR Weapons School are the seed corn for the strategic change which MISR is introducing.

And during my visit to Jax Navy during the week of June 14th, I had a chance to talk with the first MISR officer deployed to the fleet, LCDR Tracy Maddox.

Her call sign is "Mad Dog" and is as she described herself a "VQ" person by trade and an EP-3 operator.

She became a MISR officer through her engagement at NAWDC and worked with "Two Times" there as well. She was involved in the standing up of the MISR cell at NAWDC which has now become a full warfighting course. She now is with VPU-2, a heralded squadron in the US Navy involved in "special projects."

An October 2, 2018 article by Richard Burgess of *Seapower Magazine* highlighted the squadron as follows:

The Navy has established a new unit to sustain a special mission capability in its maritime patrol community with the coming retirement of the P-3 Orion aircraft.

*A Sept. 10 internal directive from the Office of the Chief of Naval Operations directed the establishment on that date of Fleet Support Unit One at Naval Air Station Jacksonville, Florida, one of two sites that serve as home bases for the Navy's P-8A Poseidon maritime patrols aircraft.*

*According to the directive, Fleet Support Unit One "will configure and operate P-8 aircraft to provide a follow-on special mission capability in place of [special] projects patrol squadron (VPU) P-3 aircraft due to sundown in 2019."*

*The mission of the unit will be to provide "oversight, training, operations, maintenance, and configuration management for the P-8 quick reaction capability aircraft," according to the directive.*

*Fleet Support Unit One will have an officer in charge rather than a commanding officer, who will report to commander, Patrol Reconnaissance Wing 11, at Jacksonville.*

*The Navy's sole VPU squadron, VPU-2, operates several specially configured P-3C Orion aircraft from Marine Corps Air Station Kaneohe Bay, Hawaii. The squadron is scheduled for deactivation in fiscal 2019 in concert with the phase-out of the P-3C from operational active-duty patrol squadrons.*

**LCDR Maddox noted that the EP-3 community works closely with the USAF, so this has carried over for the MISR community and in terms of NAWDC working with Nellis as well.**

But she clearly highlighted the challenges to getting the USAF and the USN to work fully together in shaping enhanced integratabilty but clearly the MISR standup was an important step in moving in that direction.

LCDR Maddox was posted to the USS George H. W. Bush CSG-2 under the command of Rear Admiral Kenneth Whitesell, now Deputy Commander of the US Pacific Fleet and soon to be the next commander of Naval Air Forces and and commander of Naval Air Force Pacific

During that deployment, the Admiral explored ways that a MISR approach could enhance the lethality of the fleet.

**The experience shaped a demand side as well where as Vice Admiral Miller put it, there is desire to have MISR officers in every carrier strike group and at the fleet level as well.**

And technology needs to be shaped to allow for this kind of innovation.

A case in point is Minotaur.

As Rear Admiral Garvin put it: "The Minotaur Track Management and Mission Management system was developed in conjunction with the Johns Hopkins University Applied Physics Laboratory.

"Minotaur was designed to integrate sensors and data into a comprehensive picture which allows multiple aircraft and vessels to share networked information.

"It is basically a data fusion engine and like many software capabilities these days, doesn't physically have to present on a platform to be of use.

"These capabilities ride on a Minotaur web where, if you are on the right network, you can access data from whatever terminal you happen to be on."

LCDR Maddox underscored from her point of view that bringing the various wave forms into a single screen via Minotaur allows those data streams to come together and to shape a common operating picture.

She underscored that with different assets using different operating pictures the full value of the ISR streams was not being realized.

**"With the Minotaur web everyone has access to the same COP regardless of whether you are airborne or onboard a ship."**

In my view, the MISR incorporation in the fleet, plus the coming of Triton are opening the aperture in understanding of how to widen the scope of what a fleet can achieve within the extended battlespace.

**And this is clearly a cultural shift as well.**

As LCDR Maddox put it: “It’s a very different mindset shift.”

With regard to the carrier strike groups, the core focus has been upon the fast jets and kill chains.

But with the ISR/C2 revolution and the ability to do third party targeting, the kill web is becoming a reality.

But this means that the Admirals who have come through the fast jet community are facing the challenge of changing their approach as well to incorporate MISR and dynamic targeting, ultimately in a joint capability environment.

In my view, the standing up of MISR is significant in and of itself, but lays a foundation for the way ahead.

And quite an honor to meet the first MISR officer assigned to a carrier strike group.

This is also a significant generational change as the digital natives become more prevalent within the fleet, and who experienced rapid apps upgrades and want to see the same being delivered in terms of knowledge to the fleet operating in a dynamic combat environment.

# The Arrival of Triton in the Pacific: New Manned-Unmanned Teaming Capabilities and Delivering new C2/ISR capabilities

01/28/2020

The first two MQ-4C Triton unmanned aircraft arrived in Guam over the past weekend.

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

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

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

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

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

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

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

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

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

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

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

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

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

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

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

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

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

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

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

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

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

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

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

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

*"We need an effective cross-domain solution.*

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

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

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

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

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

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

*Footnotes*

1. These quotes were taken from an article by Ben Warner, *USNI News*, which was published on January 27, 2020.

   https://news.usni.org/2020/01/27/navys-first-mq-4c-triton-unmanned-aircraft-deploy-to-guam?utm_source=USNI+News&utm_campaign=bd030932c0-USNI_NEWS_DAILY&utm_medium=email&utm_term=0_0dd4a1450b-bd030932c0-230422265&mc_cid=bd030932c0&mc_eid=d5b4bb05ef

# Training for Force Integration: The Perspective from the Air Warfare Center, Nellis AFB

05/21/2020

By Robbin Laird and Ed Timperlake

We visited the USAF Warfare Center in 2015, when Major General Jay Silveria, was the commanding officer. A visit last month was postponed due to the COVID-19 impacts, but, hopefully, we can return later this year.

But we did have the opportunity to have a round table via teleconference on May 12, 2020 with the following officers: Colonel Jack Arthaud, Commandant of the USAF Weapons School (USAFWS), Lt. Col. Ethan Sabin, Commander of the 6th Weapons Squadron, and Lt. Col. James Combs, Commander of the 8th Weapons Squadron, Major Peter Mattes, Director of Operations, 19th Weapons Squadron.

**We started by asking Col. Arthaud how the training approach being pursued currently differed from his earlier experiences.**

"In a word, I would say integration. Clearly, what has evolved is a much more challenging and complex air warfare environment. We have shifted from a primary focus on training to execute de-conflicted operations or parallel operations, to higher levels of teaming, higher levels of group coherency and integration, because that's what the threat demands.

"When I was a student in 2006, the 22-week course spent 20 and half weeks on individual weapon systems expertise with the remainder on collaboration. Our way of war then was focused on de-conflicted air warfare or sequential air operations, As an F-15C operator we would focus on doing our air sweep and then there would be follow up strike packages and then a wide variety of support assets in the air operation.

"We were not an integrated weapons school but we added a number of elements, such as the Mobility Weapons School, and a full complement of air, space, cyber and special operations platforms, all resident in the Weapons School today which facilitate training for integrated force packaging.

“And with the shift to deepen integration, our integration phase of training is now six of the 22 weeks versus to the week and a half I went through as a student 15 years ago.

“With this has come a shift in the skill-sets we prioritize and develop. What it means to be credible has changed over the last 15 years.

“At that time, being credible really meant being the best fighter pilot in your aircraft or being the best tactical C2 controller, as examples. And now what we’ve seen is that there’s a need for leadership of the integrated force.

“There’s an increased need for critical thinking and problem solving. There’s a need to understand the capabilities of your platform in depth — not only so you can optimize the employment of your own platform, but so you can understand how best to combine your platform with others, to best to accomplish the functions and tasks that are necessary to solve the tactical problems facing the integrated force.”

The Colonel provided a very clear differentiation between then and now, and in the discussion which followed we discussed a number of key aspects of the approach being shaped now in close interaction with the other warfare centers which are operating in relative close proximity, namely, USN NAWDC, and the USMC MAWTS-1.

In fact, officers are embedded from each of these centers within each other’s centers as well.

**What we will do for the rest of this article is to highlight some key takeaways from the discussion, with some extrapolations from those takeaways along the way as well,**

The first takeaway is that clearly the services are working dynamic problem-solving approaches.

They are dealing with evolving adversary capabilities and approaches, and the services clearly are not assuming that they “know” in advance what will be experienced the battlespace.

The warfighting centers are cross-learning with regard to anticipated threats, tactics and challenges rather than coming up with single service solution sets.

A very different training regimen is required for force integration to shape a force designed almost on the fly to operate against an evolving threat environment.

At Nellis, they are focusing on effects-based training where the focus is upon problem solving to achieve a specific effect required for specific tactical operational settings.

As one officer put it: “We’re trying to train our weapons officers, our instructors, and our operational Air Force officers to be able to adapt effectively in a period of uncertainty or in a fight with more uncertain terms.

“I think that we need to be prepared for some technological surprises that might occur and we need to train to that reality.”

The officer added: “We don’t know for sure exactly what we might see, but let’s go ahead and make some reasonable guesses about what a difficult task or problem might be, and then let’s allow our instructors and our students to innovate and try to go solve that forward-looking tactical problem.”

The second takeaway is that the USAF is clearly leveraging what fifth generation capabilities can provide for the joint force.

During our 2015 visit, the first F-35 for the Weapons School had just arrived and Major General Silveria had recently become the first USAF general officer to complete qualification training in the F-35.

Now with the three services each operating the jet, they are working the significant integration opportunities which flying the same aircraft provides across the force, but remembering that the USAF has forty years of experience in flying low observable aircraft, a legacy experience which provides certainly a leg up on global adversaries, if leveraged properly in the training and operational arenas.

The third takeaway is clearly that the team is thinking in kill web terms, or in terms of an integrated, distributed force.

They are working closely with the US Navy in terms of shaping how distributed maritime operations can come together most effectively with the USAF’s evolving airpower distributed operations capabilities as well.

And with the USMC able to shape a very flexible mobile basing capability on the kill web chessboard, shaping ways to maximize the capabilities the individual services bring to the fight but to do so through interactive sensor webs to shape effective distributed strike is an evolving focus for force integration.

And for distributed operations to work effectively, one of the challenges is finding ways to enhance C2 capabilities at the tactical edge and resident in mobile bases to support the overall integrated force.

The fourth takeaway is that the objective is clearly to have greater capability to operate through what is be labelled the advanced battle management system.

But in many ways, the force is already doing so through the capabilities already fielded and being shaped on the training ranges. One officer referred to ABMS as the available battle management systems which is a good way to differentiate between the training for the fight, we are in now versus a world in 2030.

“The best way I would characterize how C2 has changed in the last decade is less vertical orientation and more horizontal feeders out there in order to create our own web of information sharing with what I term the current ABMS, which is the available battle management system.”

The fifth takeaway is how training for distributed integrated operations is yielding innovative ways to operate which have strategic consequences.

Too often it is assumed inside the beltway that operations and tactics are on a level distinctly different from the strategic level, thereby easily missing the kinds of innovations going on at Nellis and its sister warfighting training centers.

**The kind of kill web integration which is being shaped now and with the addition of new capabilities in the near and midterm has a strategic consequence**.

For example, the challenges China presents to the United States and our allies in the Pacific requires that air and maritime domains partner well.

Working to shape how to partner effectively at the tactical level in a kill web approach allows the United States and its Allies to keep the Chinese off balance and not allow them to prepare for a one attack vector.

They have to be prepared for a much wider variety of potential dilemmas that we could throw at them.

For example, the US Navy and USAF are working closely together in the electronic warfare domain. The approach is to leverage the relevant platforms to provide for a variety of capabilities which can be used to degrade the enemy's C2 or air defenses.

**Training to integrate the platforms to achieve a wider range of attack envelopes to complicate the adversary's calculations is tactical training with a strategic impact.**

And this area is clearly a growth area given the enhanced importance of digital systems to the combat force, both Blue and Red.

The sixth takeaway which is clearly kill web related is the significant change over the past decade with regard not just to sensors but the ability to move sensor data around more rapidly in the battlespace to allow for more effective decision making at the tactical edge.

Obviously, this is a key driver changing both the capabilities to integrate platforms, but also how to command task forces operating in integrated rather than sequential manner.

The shift from hierarchical C2 to empowering tactical decision making at the edge is clearly a significant part of the change as well for the training world.

**How best to empower rapid decision making at the tactical edge but ensure more effective strategic decision making with regard to how to manage the battle, and how to best determine which targets are prioritized?**

Notably, in the Pacific there are three nuclear powers.

Nuclear deterrence is woven throughout any considerations of conventional operations, so there is a clear need to add a strategic overlay of the battlespace, which considers potential consequences and focuses on making the right target decisions in a fluid battlespace.

In short, what we heard from the USAF officers was, not surprisingly, highly congruent from what was learned from discussions at Norfolk, Virginia earlier this year in a discuss with three senior admirals with regard to the shift in training.

"The synergy across the training enterprise is at the heart of being able to deliver the integrated distributed force as a core warfighting capability to deal with evolving 21st century threats.

“There are a number of key drivers of change as well which we discussed.

“One key driver is the evolution of technology to allow for better capabilities to make decisions at the tactical edge.

“A second is the challenge of speed, or the need to operate effectively in a combat environment in which combat speed is a key aspect, as opposed to slo mo war evidenced in the land wars.

“How to shape con-ops that master C2 at the tactical edge, and rapid decision making in a fluid but high-speed combat environment?

“In a way, what we were discussing is a shift from training preparing for the next fight with relatively high confidence that the next one was symmetric with what we know to be a shift to proactive training.

“How to shape the skill sets for the fight which is evolving in terms of technologies and concepts of operations for both Red and Blue?

# Visiting the Naval Aviation Warfighting Development Center (NAWDC): July 2020

08/03/2020

By Robbin Laird

The US Navy is in the throes of reworking its capability to prevail in the high-end fight while ensuring its ability to engage in full spectrum crisis management.

There is no clearer proof of this judgment than the latest efforts at the Naval Aviation Warfighting Development Center (NAWDC).

Most people know this as TOPGUN and envisage Tom Cruise-type characters preparing for air combat somewhere in global conflict.

**But today’s NAWDC is focused not simply on training for the integrated air wing, but the integratable air wing engaging in leveraging and enhancing fleet-wide operations and working closely with joint and coalition force partners.**

As the center of excellence for Naval aviation training and tactics development, the Naval Aviation Warfighting Development Center or NAWDC works to ensure an effective, integrated, and lethal force to prevail against increasingly sophisticated adversaries.

In a way, with the coming of a new generation of aircraft, Advanced Hawkeye, Triton, P-8, MQ-25 and F-35, the reach of the carrier air wing is beyond the range of the integrated air wing.

And NAWDC is an epicenter of practical ways to build out today's navy into an effective integrated distributed force capable of operating as interactive kill webs delivering effective strike, defense, and deterrence against adversaries in the global "commons," as it used to be called.

Over the past few weeks, I have had the chance to have a series of teleconferences with the department heads at NAWDC prior to my visit to the desert-based air wing during the week of July 5th. I will provide articles based on discussions during that week later this summer.

But in this article, I would like to focus on my discussion with the CO of NAWDC, Rear Admiral Richard Brophy.

I would note that after my time in the desert, I flew to San Diego where I had a chance to meet with the Navy's Air Boss, Vice Admiral Miller, and to talk with the new commander of the Osprey squadrons coming into the Navy as well as to a senior Romeo commander as well.

The discussion with Rear Admiral Brophy started with a simple question: "Obviously, NAWDC is in significant change, and your job seems to be to expand the dialogue between NAWDC and the rest of naval warfighting centers as well as the USAF and the USMC and with allies. How would you describe your job?"

Rear Admiral Brophy: "Admiral Miller gave me the following charge when I took command: 'Snap', when you go there get us in a great power competition mindset. From a wholly-integrated perspective, look at what we need to do at NAWDC in order to win the next fight.'"

"And to do this he emphasized that my job was to pursue holistic training with the Navy and to work with other U.S. warfighting centers and key allies."

In other words, NAWDC is focused on training the integratable air wing.

And as my earlier interviews have highlighted, the platform-centered warfighting courses have focused more broadly on the coming of new capabilities and integratability as well as two new non-platform centric warfighting courses having been established, namely, MISR and Information Warfare.

**During my visit, several key developments stood out.**

First, there is a re-imaging of the carrier going on associated with the return to blue water operations and rethinking how the carrier works with the fleet to deliver enhanced expeditionary reach that the carrier air wing can support.

This has meant a growing working role with the Marines, who in Rear Admiral Brophy's words "have significant experience and expertise with expeditionary operations, and with whom we can collaborate to develop new concepts of operations."

Rear Admiral Brophy underscored that there was clearly an enhanced working relationship with MAWTS-1 at Yuma MCAS going on as a result.

Second, this has meant that the US Navy and the USAF are establishing new ways to work more effectively together.

Earlier this year, the USAF sponsored WESTPAC.

As we noted earlier about WESTPAC: "The USAF led a joint exercise in January 2020 focused on the Western Pacific. The exercise had the stated purpose of distributing airpower throughout the operational area and working integratability to shape the desired combat effect."

Rear Admiral Brophy noted about WESTPAC: "The USAF invited NAWDC to the exercise to represent the Navy, and we went with a full complement which included surface and subsurface officers.

"The co-chair of the WESTPAC working group was a Surface Warfare Officer who had a clear notion that we need to look beyond what the Navy brought to the fight in order to be effective in our Pacific mission."

Third, the theme of integratability beyond the carrier air wing is a key one being worked at NAWDC.

As Rear Admiral Brophy put it: "From a training standpoint, we work from the perspective of 'it is not going to be a carrier strike group that wins the next fight on its own, it's going to be an integrated joint force that wins the next fight.'

"We've really broadened our aperture.

"Everything we do here now is based off of a single lens: does it move the needle for great power competition or not?"

Fourth, an integrated training center has been built from the ground up to support the integratable air wing to train in the kill web space.

After the interview we toured the new facility which consists of two buildings.

The first building is a meeting center with areas for working groups to meet at various levels of security within a global teleconferencing framework, as the need demands. This building can allow for scenario generation, assessment of findings and evaluations from the physical test range, or utilization of the simulated test range that is contained in the second building

The second building houses multiple simulators for different platforms being flown by the fleet. As Rear Admiral Brophy put it: "We're going to put in an entire Air Wing's and strike group's worth of simulators."

The focus is not only on platform learning, but significantly, working in an integratable environment. Those specific simulators, continued in various rooms in the building, can be linked with outside simulation facilities as well.

As Rear Admiral Brophy put it about the new facilities and their contribution: "The Integrated Training Building will be the future of virtual and constructive training for the majority of naval aviation.

“Not only will we provide cutting-edge training in Fallon, but fleet concentration areas will be able to train remotely with the Subject Matter Experts (SMEs) at NAWDC in a virtual, constructive environment at any time, day or night.”

Fifth, even with the new facility, changes are necessary with the physical ranges to adjust to the high-end training of fifth generation warfare.

There are requests in to adjust the ranges to accommodate the kind of targeting challenges which the high-end air arm needs to train for to prevail in the high-end fight.

“Fallon is the only United States Navy facility where an entire air wing can conduct comprehensive training while integrating every element of air warfare.

“While aircraft and weaponry have evolved substantially in the last several decades, the ranges at Fallon have not changed significantly in size since 1962.

“Our naval aviators use the desert skies to learn critical warfighting skills necessary to defend our nation and preserve our way of life from those who would want to cause us harm.

To that end, we are working with the local community, as well as natural and cultural resource experts, to find a way forward together to expand the range.”

Sixth, a measure of the change at NAWDC has been the generation of working groups based at NAWDC that reach out to the fleet to devise and implement new ways to operate in the evolving strategic situation. COVID-19 has slowed down this process, but the trajectory is clear.

For example, in the first quarter of this year, NAWDC sponsored work with the other Navy warfighting centers to address the question of fleet-wide TTPs to execute maritime strike.

The purpose here is clearly to think beyond the classic airwing focus to a wider integratable air wing in support of fleet-wide operations.

**Clearly, the new infrastructure highlighted above would be a key asset in shaping such new TTPs for the fleet and its integratability into the joint and coalition force.**

Seventh, the new MISR or Maritime ISR warfighting center is managing an important new Navy exercise, Resolute Hunter, which is focused on the evolving role of ISR and sensor networks in guiding C2 and integrated operations going forward.

The second such exercise will be held in November of this year, and will include Australians, Brits, Marines, and the USAF.

As Rear Admiral Brophy put it: “In the Resolute Hunter exercise, we are really looking hard at the Kill Web aspect and focusing on utilizing every asset that’s out there to ensure that we’re the most effective warfighting force we possibly can be.”

**Taken together, the work of MISR, the Information Warfare program, Resolute Hunter, and the work with the Marines and the USAF, highlights the challenge and opportunity for shaping a Maritime Squadron Targeting Concept.**

This is a clear expression that NAWDC and the Navy are focusing on ways to leverage an integratable air wing for the fleet, and for the joint and coalition force.

**As Rear Admiral Brophy put it: "What exactly do 21st century fires look like from a Maritime perspective?"**

Eighth, Rear Admiral Brophy underscored how important it was to ensure kill web capabilities and effectiveness.

A distributed fleet without integratability delivered by interactive kill webs would weaken the force.

It is crucial to ensure that a distributed force has ready access to fires across the joint and coalition force to ensure combat dominance.

A kill web approach is not about having distributed orphans across the extended battlespace, but an integrated honeycomb force.

**In short, NAWDC is a key epicenter where the current force is becoming more capable and lethal, and the aperture of the integratable air wing has been opened to provide a key venue for the kind of force transformation needed for full spectrum crisis management dominance.**

# An Update on the Integratable Air Wing: A Discussion with the US Navy's Air Boss

07/23/2020

By Robbin Laird

Last February, I visited San Diego and met with Vice Admiral Miller, the US Navy's Air Boss.

During that meeting, we discussed a shift from what I call the integrated to the integratable air wing and its impact on innovation for the fleet and the joint force.

During that discussion, I learned about the introduction of the MISR WTIs or the Maritime ISR Weapons and Tactics Instructors (WTIs), who are specially trained officers and enlisted, to the ranks as well as of the coming of the Osprey to the carrier force in the near term and the MQ-25 unmanned air tanker to the fleet in the mid-term.


Our discussion focused on these changes, less in terms of platforms, and more in terms of how the Navy was working to reshape its capabilities as it re-focused on the best ways to operate in high-end warfare environment as well as operating across the full spectrum of conflict.

Since that time, I have travelled to Australia and have written a report on the new Australian offshore patrol vessel.

I also continued discussions about the shaping of a way ahead for the new-build Australian submarine and had wide-ranging discussions with the USMC, the USAF, and with the US Navy.

Last month, I visited Naval Aviation locations in Jacksonville and Mayport, Florida , then had meetings with senior Navy officers in Norfolk, and then this month spent several days in Nevada with NAWDC or the Naval Aviation Warfighting Development Center.

But visiting Naval Air Station North Island in San Diego this month provided me an opportunity to discuss the way ahead being shaped by the operational or fighting Navy which might be missed if I had stayed Inside the Beltwa

Similarly, discussions with the U.S. Air Warfare Center at Nellis AFB and with the USMC's MAWTS-1 squadron, as well as with officers working at Headquarters USMC Aviation, provided an opportunity to understand how the approach to fleet-wide innovation was interacting with changes in other parts of the joint force.

Visits in 2018 by Ed Timperlake and myself to Fort Sill provided insights into how the Air Defense Artillery community was intersecting with kill-web innovations.

A clear takeaway from my discussions in the various parts of Naval Aviation and with fleet officers has been that the current Air Boss, Vice Admiral Miller, who is retiring this Fall, has provided significant leadership to encourage innovation throughout the Naval Aviation Enterprise.

And during my most recent visit to North Island this month, I had a chance to continue the discussion with the Air Boss about shaping a way ahead for innovation that I would like to highlight in this article.

At the meeting with the Air Boss, either in person or in the teleconference, was my host for the NAWDC visit and the CO of NAWDC, Rear Admiral Rich Brophy; the Chief of Staff for the Air Boss, Captain Max McCoy, most recently, head of the Navy's operational F-35C force; and the head of the N98 requirements division as well as the N98 officer involved with the MQ-25-program.

What was clear from visiting NAWDC, and from my prior discussions with the heads of the weapons training departments at NAWDC, is that the training center is focused on the integratable air wing, and the role of carrier aviation working more broadly with the fleet and the joint force.

Two new warfighting departments have been put in place which represent the shift—namely, the MISR Weapons School and the information warfare department, which is focused on the challenge of dynamic targeting.

At NAWDC, there is a significant shift from a primary focus on Tactics, Techniques, and Procedures (TTPs) for platforms and their integration on the carrier to a focus on TTPs for broader functional areas wherein TTPs need to be shaped fleet wide, such as for joint maritime strike.

With regard to MISR WTIs, their core task is to work integratability between organic carrier ISR assets with non-organic ISR assets and sensors to assist in the process of CSG decision making, and in the case of assignment to the fleet level, to do so for the fleet decision makers.

This obviously is a fundamental shift and a work in progress.

The impact of the F-35 is part of the process of change.

Currently at NAWDC, an F-35C squadron is working closely with the Hawkeye community to shape the kind of integratability which could flow nicely into the expanded reach of the fleet to deliver the combat effects necessary for either the high-end fight or full spectrum crisis management.

In thinking about the coming of the MQ-25, clearly the current focus is upon getting the asset developed to the point where it can operate off the carrier by the mid-2020s to perform a core function, tanking, and thereby freeing up manned assets for other mission sets.

It has been designed to carry the sensors that will be most useful to the fleet going forward.

**Indeed, a major change is a recognition that the evolution of the sensor network feeding decision-making fleet wide, and for the joint force, is a core focus of attention.**

But the sensors which can be envisaged do not need to be under the glass but could be passive sensors carried by new systems like the CMV-22 or the MQ-25.

What is quite impressive is that thinking is already underway with regard to what would make sense to include on these aircraft to enhance fleet lethality and combat effectiveness.

Perhaps a new role for the MISR WTIs might be to provide inputs with regard to the evolution of the fleet sensor network.

**But more generally with regard to MISR contributions, clearly the focus has been, as Vice Admiral Miller put it: "Build the capability and they will come" with regard to the recognition of the growing contributions of the sensor network and evolving C2 to fleet innovation.**

Another case in point has been the coming of the Triton to Pacific operations.

The Triton brings a whole new layer of situational awareness and targeting capabilities to the fleet, and with the growing awareness of the priority on integration of the US Air Force with Navy fleet operations, the Triton can provide a contribution to the integratability of the two services as well.

Indeed, the USAF and the USN are engaging in a clear effort to better integrate across the board, notably with regard to bombers and the fleet.

The US Navy is hosting an exercise called RESOLUTE HUNTER which is working ways to better integrate ISR, C2, and Battle Management across the forces, with the next iteration to be held this November.

The work on integratability of the various air-maritime elements, can lead as well to rethinking of how the L-class ships or the large deck carrier will operate in the future and thereby shape new capabilities across the crisis management spectrum.

I wrote earlier about rethinking how L-class ships could operate more effectively in a task force as Vipers and Romeos become integratabtle platforms with the focus of the USMC on digital interoperability generating new capabilities for the Viper to integrate.

With Vice Admiral Mille, we discussed how the new Ford class carriers can operate quite differently from the Nimitz class. With three times the onboard power systems, new C2 capabilities, an ability to host directed energy weapons, and to configure C2 cells differently, the USS GERALD R. FORD (CVN 78) conducting blue water operations could operate as a key epicenter for supporting multiple kill webs or reintegrating into a tightly integrated defensive force dependent on the evolving combat situation.

The rethinking of the operations the L-class ships and of the large deck carrier, as part of a wider set of interactive kill webs, are topics to be discussed in future articles, but the work which is unfolding under the Air Boss and in the naval aviation community (remembering that the Marines are key players in that community) clearly is underwriting new ways to work the fleet.

VICE ADMIRAL DEWOLFE MILLER, III

Commander, Naval Air Forces/Commander, Naval Air Force, US Pacific Fleet

Vice Adm. DeWolfe Miller is a native of Annapolis, Maryland, grew up in York, Pennsylvania, and graduated from the U.S. Naval Academy in 1981. He holds a Master of Science from the National Defense University, is a Syracuse University national security management fellow and is a graduate of the Navy's Nuclear Power Program.

His operational assignments include Training Squadron (VT) 19 in Meridian, Mississippi; Attack Squadron (VA) 56 aboard USS Midway (CV 41); Strike Fighter Squadron (VFA) 25 on USS Constellation (CV 64); VFA-131 and VFA-34 both aboard USS Dwight D. Eisenhower (CVN 69); executive officer of USS Carl Vinson (CVN 70); commanding officer of USS Nashville (LPD 13); commanding officer of USS George H.W. Bush (CVN 77) and as a flag officer, commander of Carrier Strike Group (CSG) 2 participating in combat Operations Enduring Freedom and Iraqi Resolve.

Miller's shore tours include Air Test and Evaluation Squadron (VX) 5; aviation programs analyst Office of the Chief of Naval Operations (OPNAV N80); Strike Fighter Weapons School Atlantic; deputy director of naval operations at the Combined Air Operations Center during Operation Allied Force; Office of Legislative Affairs for the Secretary of Defense; aircraft carrier requirements officer for Commander, Naval Air Forces; and flag officer tours in OPNAV as director for Intelligence, Surveillance and Reconnaissance (N2N6F2); assistant deputy chief of naval operations for Warfare Systems (N9B); and most recently as director, Air Warfare (N98).

Miller became Naval Aviation's 8th "Air Boss" in January 2018.

He is entitled to wear the Defense Superior Service Medal, Legion of Merit, Bronze Star, Meritorious Service Medal, Air Medal and other personal, unit and service awards.

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

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

# O.K I am a P-8 Operator: But How do I Train to Work in a Kill Web?

**06/29/2020**

By Robbin Laird

Kill webs rely on networks, wave forms, connectivity, distributed C2 and platforms which can leverage all of the former.

Platforms are the time-space entities which enable the force; integrability allows a distributed force to deliver the desired combat effect.

At Jax Navy, the P-8 operators are trained to be P-8 operators at VP-30 to be proficient at working the platform. At VP-30 takes the operators fresh out of flight school and introduces them to the P-8 as a platform and gets them safe to fly and operate in the aircraft.

**Now I am a competent "newbie" on the aircraft, beyond gaining actual operational experience, how do I train for the higher end warfighting capabilities which the aircraft can achieve when operating within interactive kill webs?**

My guide to thinking through the answer to this question was my guide for my time in Jacksonville and Mayport, Lt. Jonathan Gosselin.

He has a rather unique path to where he is currently within the Navy. "Duck Duck" is his call sign which probably comes from not wanting to have him referred to as the great baseball player "Goose" Goslin. He was enlisted navy before being recruited for the Seaman to Admiral Program. He went to The Citadel and then became a commissioned officer. He was an early P-8 officer, entering VP-45 as it became the third squadron to deploy with the P-8 in 2015. He has certainly experienced the "training wheels" phase of deployment and is now a P-8 Weapons and Tactics Instructor at the Maritime Patrol Reconnaissance Weapons School.

When he first deployed, the P-8 was an anomaly.

Now it is deployed to all of the COCOMS worldwide.

The P-8 global fleet provides ISR, Anti-Submarine Warfare and Surface Warfare products to the combatant commanders.

In his current position, he serves an innovation, cross-functional team lead where he works with innovation experts, defense industry and the Navy to shape projects which are then generated for implementation by industry. He works as well on process changes where advances in TTPs can be enabled as well.

We discussed at some length the training processes from baseline operator to weapons expert and I will outline that in a later article.

But in this article I want to highlight how the process of thinking through a kill web enabled P-8 is being shaped and trained.

For Lt. Gosselin, at the heart of the effort is really understanding, training for and executing third party targeting.

He argued that moving from a stove-piped mentality where I am both the sensor and the shooter, to a kill web perspective where the P-8 could provide the sensors for a firing solution, or whether the P-8 would deliver a weapon provided by another asset to perform the firing solution is at the heart of the change.

According to Lt. Gosselin: “What I am working on right now is shaping a curriculum to bring that capability to the MPRA community.”

He added: “We are working to develop con ops and integrate with other platforms such as the B-1, the B-52 and eventually with the B-21.

“This is where we’re trying to go with the force.

“We’ve realized that we’ve put ourselves in a stovepipe, and we have to break ourselves out of that stovepipe and understand that we are not going to win this fight alone.

“It does not matter who the adversary is.

“This is a joint fight.”

**In effect, what we are discussing is dynamic targeting across a distributed integrated force.**

As Lt. Gosselin put it: “We’re talking about taking targeting data from one domain and quickly shifting to another, just like that. I have killed target under sea.

“I am now going to go ahead and work the surface target and being able to understand the weapon sensor pairing network, and being able to call in fires from different entities using commander’s intent to engage the target.

“That’s what we’re trying to do.

“Get our operators to understand that it is not just a one-piece answer.

“here may be a time when you have to kick to another shooter.”

To do so, he is engaging significantly with the Triton squadron as well to shape a way ahead for kill web dynamic targeting.

Lt. Gosselin noted: “With the P-8 and Triton we are able to expand our envelope of situational awareness.

“We can take that and now take the baseline concepts from what the P-3 did and apply them to a more advanced tactics, techniques, and procedures in the form of integrating with the B-21, the B-1, the F-18’s, the F-35 joint strike fighter in a dynamic targeting kill web.”

And with regard to the cultural shift, this is what he added:

“It’s important to talk not about how can I defeat this target, but really it should be, how can we defeat this target?

“Let’s break ourselves out of this stovepipe and understand that I may not always be the best shooter.

“I may be the best sensor, but I’m not be the best shooter.”

He focused on the key role which the weapons school is and will play within the US Navy to shape this cultural shift.

For the adversaries who operate below and above the sea, the evolving MPR community is not just watching those adversaries is working ways to kill you with weapons that they are not even carrying.

# Extending the Reach of the Kill Web: The US Navy Works with Allies on the Maritime Patrol Enterprise

**05/13/2020**
By Robbin Laird

In our last interview with Rear Admiral Garvin, we focused on how the P-8 / Triton dyad was reshaping the approach of the airborne element of the anti-submarine network.

We spoke at length about how the Maritime Patrol and Reconnaissance Force (MPRF) could be recast into interactive webs that will empower more effective strike at the most critical point of attack.

**In effect, what we see coming in the Pacific and in the Atlantic are interactive sensor webs that extend the reach of core platforms and their onboard sensors.**

The fusing of multiple sensors via a common interactive self-healing web enhances the ability of the entire force, including key partners and allies, to cooperatively engage enemy targets in a time of conflict.

Interactive webs can be used for a wide range of purposes throughout the spectrum of conflict and are a key foundation for full spectrum crisis management. To play their critical role when it comes to strike, whether kinetic or non-kinetic, this final layer of the web needs to have the highest standards of protection possible.

As one analyst has put it: “The kill part of the web is crucial.

“However, there are many scenarios where the same web is needed, but for other purposes.

“The point is that the “web” facilitates alignment of sensing, C2, and actionable outcomes (i.e. – shooters of various types).”

The interactive webs enhance the reach of any platform within a task force and thus create synergy amongst non-contiguous assets that are combined against a specific threat.

Interactive webs also provide redundancy and depth for distributed operations and inherent resiliency and survivability that a convergent combat force simply will not have.

We started with a discussion of the reach of the maritime patrol enterprise by focusing on a way to conceptualize the way ahead for shaping an integrated distributed force.

If one conceptualizes the battlespace as layers of visuals placed one on the other, it becomes clear what is different in terms of leveraging the combat force within an interactive web. The first layer would be the operational geography of the battlespace.

The second layer would be the threat elements most relevant to the blue force.

The third layer in the case of a maritime patrol enterprise would be commercial maritime shipping traffic. Unlike air traffic, maritime traffic is very diverse, very large, and provides a key masking function for any adversary.

The fourth layer would be the laydown of blue assets, including the geographic distribution of allied forces in the region or area of interest. The fifth layer would then be where the P-8 / Triton dyad operates.

**With such a schematic, it is quickly evident that if the U.S. Navy's P-8 / Triton dyad is integratable with allied maritime patrol capabilities the reach of both the U.S. and allied interactive web capabilities is substantially enhanced.**

It is also obvious that if key allies are not engaged then there are holes in the web structure which will either simply be gaps or need to be filled by other means.

In simple terms, it is clear that the United States and its allies must operate within a convergent set of interactive webs to shape a shared and actionable common operating picture.

**The results will significantly empower a combined strike force and, even more importantly, inform decision makers about how to prioritize targets in a fluid combat situation.**

There is a particular and often intellectually neglected part of this problem–the existence of offensive nuclear capability.

As an example, in the Pacific there are three nuclear powers. Nuclear deterrence is woven throughout any considerations of conventional operations, so there is a clear need to add a strategic overlay of the battlespace, which considers potential consequences and focuses on making the right target decisions in a fluid battlespace. This "wildcard" should give pause to those who tout AI enabled kill chains.

Decision makers need to step back and consider that while more rapid destruction of targets is important, it must be guided by both tactical and strategic decisions with due regard not just to combat but political effects as well in full spectrum crisis management. Having men in the loop in airborne systems, like the MPRF can certainly contribute to target discrimination efforts.

We also considered the specific challenges of the US Navy working with allies in the maritime patrol enterprise.

For obvious reasons, we first focused on those allies who have already joined the P-8 / Triton dyad effort.

We then discussed those allies who had not done so but are key partners in working interactive webs with the United States. Prior to highlighting that discussion, let me review who the P-8 / Triton partners are to date.

Australia is the only U.S. ally pursuing both the P-8 and the Triton. As a cooperative partner, similar to the F-35, they participated in the development of P-8A and Triton capabilities from the ground up with the USN.

The British have made a very welcome reentry into the Maritime Patrol and Reconnaissance arena with the P-8 as well.

During recent visits to RAF Lossiemouth, I saw the program being stood up in Scotland, and they were doing it in such a way that other P-8 partners would be supported as well.

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

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

And talking with the RAF and Royal Navy, the changes in Norway are also part of broader UK considerations when it comes to the reshaping of NATO defense capabilities in a dynamic region. The changes on the UK side of the North Sea are experiencing the standup of a P-8 base at Lossie, which will integrate with US P-8 operations from Iceland and with those of Norway as well.

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

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

The Pacific partnership is being expanded as well with the addition of South Korea.

In 2018, the South Korean government announced that would purchase six of the aircraft. They are thereby joining India, which has its own systems configured on the aircraft. India first P-8I squadron was stood up at Rajali in November 2015.

The Indian Navy operates its entire fleet of eight P-8I maritime patrol aircraft from Rajali and the Indian government announced last year that they intended to buy 10 additional P-8s.

**With regard to the P-8 / Triton partners, Rear Admiral Garvin highlighted the opportunities for co-learning, which are generated from common training that occurs at VP-30 and the Maritime Patrol and Reconnaissance Weapons School at NAS Jacksonville, Fl.**

He highlighted the famous quote, "You cannot surge trust."

The working relationships built during high-end tactical training carry over into operations whereby a global community of operators can share operational experience and enrich development of the enterprise.

"My first international visit upon taking command was to Australia, leadership there referred to our working relationship as "mateship."

"This term accurately describes the collaborative nature of our partnership and demonstrates its importance to ourselves and the rest of the world."

"We have built similar relationships on varying scales, all around the world.

"These relationships serve as force multipliers, which opens the door to cooperatively leverage technology to deliver networked sensors and a shared understanding of the decisions and options we share across the extended battlespace."

"Our allies understand the fundamental nature of their region better than we do.

"If you have properly maintained these important working relationships, both interpersonal and technological, then you will have access to the cultural knowledge and human geography that might otherwise would not be available to you.

"We become stronger interactively with our allies by sharing domain knowledge to operate across a wider geographical area."

"In effect, we are shaping kill web "matesmanship."

“We clearly have closer relationships with some allies than with others, which shapes policy and data sharing. However, the technology is now out there which can allow us, within the right policy framework, to provide data at appropriate security levels much more rapidly than in the past.

“Our policy frameworks simply need to catch up with our technologies.”

“History has shown us that it is infinitely more difficult to sort out our working relationships in times of intense conflict.

“Those partnerships need to be nurtured and exercised now to help shape our interactive webs into a truly effective strike force over the extended battlespace.”

**For Rear Admiral Garvin, working with partner and allied maritime patrol partners is crucial, even when those close partners are operating different platforms.**

For example, Japan indigenously developed their own replacement aircraft for its legacy P-3s. He highlighted the healthy sharing arrangements the U.S. Navy has with the Japanese Maritime Self-Defense Force in the MDA area.

Similarly, we enjoy a very close relationship with Canada, who operates a significantly modernized P-3, the CP-140 Aurora. He noted that the aperture for increased cooperation with India was opening up as well, a process which he clearly welcomed.

As Rear Admiral Garvin put it: “Put simply, the idea of partners and allies sharing in the web you describe must have, at its core, that underlying, underpinning relationship built upon trust.

“Sometimes buying the same kit does make it easier. But without that relationship it doesn’t matter if you bought the exact same kit.”

# A Key Element for the Future Evolution of the Integrated Distributed Force: Evolving Remote Maritime Capabilities

**10/17/2019**
By Robbin Laird

In today’s world, full spectrum crisis management is not simply about escalation ladders; it is about the capability to operate tailored task forces within a crisis setting to dominate and prevail within that crisis.

If that stops the level of escalation that is one way of looking at it. But in today's world, it is not just about that but it is about the ability to operate and prevail within a diversity of crises which might not be located on what one might consider an escalation ladder.

They are very likely to be diffuse within which the authoritarian powers are using surrogates and we and our allies are trying to prevail in a more open setting which we are required to do as liberal democracies.

This means that a core legacy from the land wars and COIN efforts needs to be jettisoned if we are to succeed – namely, the OODLA loop.

This is how the OODA loop has worked in the land wars, with the lawyers in the loop, and hence the OODLA loop.

The OODA loop is changing with the new technologies which allow distributed operators to become empowered to decide in the tactical decision-making situation.

But the legalistic approach to hierarchical approval to distributed decisions simply will take away the advantages of the new distributed approach and give the advantage to our authoritarian adversaries.

What we are seeing is a blending of technological change, with con-ops changes and which in turn affect the use and definition of relevant military geography.

In other words, the modernization of conventional forces also has an effect on geography.

As Joshua Tallis argued in his book on maritime security, the notion of what is a littoral region has undergone change over time in part due to the evolution of military technologies.

"Broadly speaking, the littoral region is the 'area of land susceptible to military influence from the sea, and the sea area susceptible to influence from the land.'

"In military terms, 'a littoral zone is the portion of land space that can be engaged using sea-based weapon systems, plus the adjacent sea space (surface and subsurface0 that can be engaged using land-based weapon system, and the surrounding airspace and cyberspace.'

"The littoral is therefore defined by the technological capability of a military, and as a result, the littoral is not like other geographic terms."[1]

What is changing is that the force we are shaping to operate in the littorals has expansive reach beyond the presence force in the littorals themselves.

If you are not present; you are not present. We have to start by having enough platforms to be able to operate in areas of interest.

But what changes with the integrated distribute ops approach is what a presence force can now mean. Historically, what a presence force is about what organically included within that presence force; now we are looking at reach or scalability of force.

We are looking at economy of force whereby what is operating directly in the area of interest is part of distributed force.

The presence force however small needs to be well integrated but not just in terms of itself but its ability to operate via C2 or ISR connectors to an enhanced capability.

But that enhanced capability needs to be deployed in order to be tailorable to the presence force and to provide enhanced lethality and effectiveness appropriate to the political action needed to be taken.

**This rests really on a significant rework of C2 in order for a distributed force to have the flexibility to operate not just within a limited geographical area but to expand its ability to operate by reaching beyond the geographical boundaries of what the organic presence force is capable of doing by itself.**

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.

This requires tailored force packaging and takes advantage of what the new military technologies and platforms can 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.

I**n the maritime domain, an evolving capability which will operate in concert with capital ships are unmanned maritime systems or remotes.**

Such systems come in two forms: underwater unmanned systems and surface unmanned systems, which when the con-ops matures will work interactively with one another to extend the reach of the manned surface fleet to provide for perimeter defense via a flexible picket fence so to speak, and to provide a significant impact to the reworking of C2 highlighted above.

In many ways, the F-35 force package is directly forcing a significant revision of where D takes place in the OODA loop. Tactical decision making at the edge needs to be worked as the F-35 pushes decision making capability to the edge.

As that is worked through, the next phase will entail how remotes can provide not just SA and remote targeting capabilities, but share in the decision making with the humans in the loop.

For the Air Forces, this will be about sorting through how loyal wingman can work with manned combat air assets; for maritime forces it will be about how above and below sea remotes can be woven into the extended reach of a capital ship and become part of a force package, and, in turn, changing the nature of what a combat fleet looks like.

**In other words, there are waves of learning how to work with remotes and to incorporate them into an integrated distributed force.**

Over the next five years, we will see a significant presence of maritime remotes and as operational experience is gained, the next wave of learning will go from treating these as platforms adding to the capability of the fleet, to becoming core parts of an integrated distributed force with significant changes in the concepts of operations of the combat fleets as well.

**During my visit to the Chief of the Royal Australian Navy's Seapower conference which was held in Sydney from October 8th through the 10th, 2019, I had a chance to discuss with officers of the Royal Australian Navy as well as defense industry leaders the evolving maritime remote capabilities currently available and on the horizon.**

One of those industry leaders I met with was Daryl Slocum of L3HarrisTechnologies.

He has been involved with maritime remote systems since his graduate student days and as head of the OceanServer program, is based in Massachusetts at the L3Harris facility located there. He was at the conference engaging with various Navies attending the conference to discuss the capabilities which L3Harris has in the maritime remotes area.

I took advantage of his presence to discuss more generally how one might understand how maritime remotes are developing and might develop in the future, and their role and contribution to the maritime combat force.

Slocum views maritime remotes as force multipliers.

As the durability of the systems evolves and they can operate at greater range and operate with greater loiter times, the core question is what the fleet commanders want these systems to do.

**This means that the focus is clearly upon payloads, and how to take the information on these remotes generated by the various payloads and to get that information in a timely manner to the users in the combat fleet.**

Right now, unmanned underwater systems can operate with a variety of payloads, the most significant of which can provide remote mapping and situational awareness.

As the capabilities to do onboard processing on the remotes ramps up, information can be processed on the platform and with the aid of evolving artificial intelligence can determine provide for information parsimony.

This means that the systems onboard the platforms as their capabilities evolve will be able to send core information to users highlighting threats and opportunities for the combat fleet.

And as the ability of the remotes to work with one another evolves, surface and subsurface remotes will be able to work together so that the communication limits imposed by underwater coms can be mitigated by surface remotes working as transmitters.

We discussed the impact of these projected capabilities on capital ship design.

It is clear that new capital ships need to have onboard processing capabilities and decision tools to be able to leverage what a deployed system of remotes might be able to deliver to that capital ship.

This means as well that maritime warriors will need to learn to work with thinking machines as decision making at sea will evolve as well.

Slocum highlighted that the Iver family of L3Harris underwater remotes were platform agnostic, which meant that they can work with a wide variety of users worldwide.

This means as well that they can focus on building a platform which is battery agnostic as well to incorporate changes in the evolution of battery capabilities, which are of course, crucial to durability, speed and range of the remotes.

We both agreed that is important to get these systems out of the labs and into the fleet to get the kind of operational experience necessary to drive innovation moving forward with essentially a software upgradeable platform.

Slocum indicated that they had this kind of relationship with the US Navy in San Diego as the US Navy gets read to tap into remotes as a key part of the counter mine mission.

As he described the goal of a remote platform which is payload agnostic:

“Today, I want to do a side scan mission; tomorrow, I might want to do an ISR mission; and the day after tomorrow, I might want to do a SiGINT mission.”

By having a small form factor platform, with a capability to operate with a diversity of payloads, the remote can be incorporated into a wide array of missions which can expand what the capital ship itself is capable of doing.

**Indeed, the impact of remotes can expand what a support fleet can do.**

There is no reason that a U.S. Military Sealift Command ship cannot incorporate remotes and expand the concept of what kind of support MSC ships can provide, beyond physical things such as fuel and supplies.

In other words, remotes can provide for con-ops diversification within the combat fleet, including the supply component of that fleet as well.

Clearly, such capabilities could provide significant enhancements with regard to perimeter defense in various ways, including masking what that remote actually is and what it is doing.

Currently, L3Harris has more than 300 Iver platforms operating worldwide, with 2/3 of them with military customers and 1/3 with civilian customers, including research centers as well.

**We closed by discussing where the remote capabilities might be in five years' time.**

Slocum saw Iver as being able to operate for longer times, and taking onboard new payloads. He projected that onboard processing capability would take a leap forward which would lead to making more timely use of the data being collected by the remotes.

A key breakthrough point will be when remotes can make a decision about which data needs to be sent back home to the human decision maker.

Beyond the five year time line, Slocum saw that after working through operational experience in that time period, the ability of remotes to work together would become more mature.

**And as that capability evolves, the entire reworking of the decision cycle will evolve as well.**

In short, it is not just about remotes as a platform; they are being introduced at the same time as the military is undergoing a transformation to shape an integrated distributed force.

And for the maritime forces, remotes will provide a core capability to fleet enhancement.