CHENNAULT TTX 1.0 AFTER ACTION REPORT

Multi-Domain Operations in the United States Air Force

Abstract

Multi-domain operations in the United States Air Force are not new. However, they have never been employed as broad as current warfare demands and the complications of effectively employing capabilities across domains are daunting and require exploring.

Mr. Allen Moore, Air Force Lessons Learned, ivan.moore.4@us.af.mil

Executive Summary

The Curtis E. LeMay Center for Doctrine Development and Education Commander directed his staff to develop and execute a series of Multi-domain Operations (MDO) wargames, starting with a table top exercise (TTX), to identify seams and shortfalls between current Air Force doctrine and the doctrine required for highly-integrated, effective MDO. Over 3-4 December 2019, 164 personnel from within and outside the Center participated in Chennault TTX 1.0, at The LeMay Center Wargaming Institute, LeMay Center, Maxwell AFB. 54 participants were internal to the LeMay Center, while the rest consisted of both students and staff within Air University and subject matter experts from PACAF, Headquarters Air Force (Checkmate and The Air Force Warfighting Integration Capability (AFWIC)), numerous outside units (including Multi-Domain Command and Control Officer – 13O graduates) and MITRE. The purpose was to survey and assess the US Air Force's ability to execute multi-domain operations in a fully integrated fashion to generate effects across multiple domains.

As the first event in the Chennault series, the TTX encouraged participants to take a wide path to consider how to do MDO. Each of the eight MDO-focused groups were asked to explore the Air Force's ability to execute MDO. At the end of the TTX, each group briefed their insights to the Air University Commander, the LeMay Center Commander, and the Holm Center Commander. Also observing the outbriefs were representatives from LeMay Center's Doctrine Development, Wargaming and Lessons Learned Directorates. These representatives identified five common topics players proposed.

- **COMMON TOPICS #1:** Interoperability and compatibility within the Air Force, between the Services and combatant commands as well as allies and multinational partners at the level necessary to engage a peer adversary over strategic distances will require us to reassess every process rule. To expand interoperability and compatibility, our acceptable risk level must change across the enterprise.
- **COMMON TOPICS #2:** Well-educated and well-trained Airmen win wars. PME and operational training needs to focus on modern multi-domain operations.
- **COMMON TOPICS #3:** Against a peer adversary, being able to consistently generate mass to overwhelm the adversary and change his decision space is very difficult. It is possible that simply overwhelming the adversary's defenses with technologically inferior and inexpensive capabilities or through deception techniques can be more effective than more superior and expensive ones. Redundancy is a concept that most of the joint community moved away from in the last 20 years, as we tried to execute Irregular Warfare and/or perhaps to maintain military superiority as efficiently as possible. Airmen fighting a peer competitor should expect severe attrition in all domains and plan accordingly. We need analysis to define the level of attrition we should expect in all the domains and how we should mitigate it.

- **COMMON TOPICS #4:** There has been a lot of interest recently in artificial intelligence (AI). There is also a lack of understanding of what AI is and what it can do. More directly, the participants are asking for machine tools that can enable the warrior, such as for planning, execution and C2.
- **COMMON TOPICS #5:** Where is our capability to defend our bases of operation such that significant combat capability continues after attack?

Other topics the participants discussed covered a wide range. For example, some participants were unable to separate MDC2 from MDO, even though the guidance they were given asked them to do so. They recognized the need for a robust communication network and renewed focus on C2 policies, processes, methodologies and training to enable MDO capabilities and effectiveness. They recommended the Air Force upgrade deliberate MDO planning and training (Flag Multi-Domain Exercise). In addition, Air Force MDO Doctrine needs to be developed in a joint context and be global in its application.

Improving Information Operations (IO) capabilities was favored by some participants but there existed very little understanding of what the Air Force's role in IO was and what capabilities resided in the service. There was a desire to make every air-breathing and space platform a sensor, as well as increase capability for shared situational awareness across platforms with multi-level security options. Some participants wanted to reduce our dependence on GPS. Some sought increased global kinetic and non-kinetic capabilities. Other participants saw a need for composite wings designed for MDO. The participants suggested that commercial space capabilities need to be analyzed and choices made over how they will be treated in war.

The participants noted that partnerships with other nations should be treated as an Air Force core function. To enable them and also provide multiple dilemmas for our adversaries, we need to significantly improve their self-defense and interoperability capabilities.

There was concern whether current organizations are structured to enable MDO. Specifically, in the joint community, some questioned whether geographic combatant commands are the best structure for a multi-domain fight. They also questioned whether the Air Force MAJCOMs are the right structure to provide MDO capabilities.

Participants noted that the Air Force was challenged to attract and keep talented non-kinetic operators. Suggested the use of commercial operators and even exploring the use of privateers.

TTX 1.0 was the first in a series of events intended to inform future MDO doctrine. The intent is to use each subsequent event as a building block for future events. As such, The LeMay Center will execute TTX 2.0 from 11-13 FEB 2020, with a focus on the targeting process within the Air Operations Center (AOC). This will provide scrutiny of the integration of space, cyber, and the Electromagnetic Spectrum (EMS) within targeting. The results from this event will inform future events focused specifically on Space, Cyber, EMS, and the Theater Air Control System (TACS) construct. All lessons will culminate in a major wargame during the summer of 2021. The goal of the wargame and the TTX series are to identify alterations to be made to the processes and products generated within the current AOC construct, facilitating a more synergistic effort and reduce the amount of time required to execute effectively.

Introduction

Most wars in our short American history have been fought against a peer adversary. After the collapse of the Soviet Union, we enjoyed a short period of relative military superiority against our foes. In OPERATIONS DESERT STORM, ENDURING FREEDOM and IRAQI FREEDOM to name a few, our adversaries faced overwhelming American and coalition military capabilities and technologies. The only other time in our history that one could likely point to an adversary and say we had superior military advantage would be the Indian wars of the 19th Century. For all other adversaries, we either faced a peer or, in the case of the Revolutionary War, fought against a superior foe. Today, we find ourselves once again facing adversaries with peer capabilities. To further tip the scales in their favor, they enjoy short lines of communications, while ours span thousands of miles.

To win a peer fight with extended lines of communications and exposed forces requires a superb operations plan, a well-trained force that is highly maneuverable and lethal from short, medium and long ranges and that can survive and operate after attack. Today's military must be able to operate across the spectrum of conflict and competition from all domains against all domains in order to create effects that will affect the adversaries' decision spaces. "Domain" is not defined in the Department of Defense Dictionary of Military and Associated Terms and different people describe domains differently. Traditionally, "domain" has included capabilities/operations in air, space, maritime and on land. More recently, cyber has been declared a domain while EMS is identified by many across DOD as a distinct, naturally occurring domain. EMS covers a broad area of activity that is characterized by light and energy and includes the frequency spectrum, Electro-Magnetic Pulse, space weather, quantum, directed energy and electronic warfare.[1] Finally, some have pushed IO (or in the joint vernacular, Joint Information Awareness (JIA)) to be a domain. We will define domain as a sphere of activity or influence with common and distinct characteristics in which warfighting functions can be conducted.[2]

Multi-domain operations (MDO) are not defined either. For the purposes of this report, we will define MDO as actions conducted in and through two or more warfighting domains simultaneously, synergistically, and at a tempo to gain and maintain an advantage over

---

[1] Electromagnetic Defense Task Force, April 2018 Report, Executive Summary, page 2
[2] Air Force Draft MDO Doctrine Note

adversaries and to achieve objectives.[3] [4] Integrated means that the capabilities from multiple domains are employed in such a way that they complement each other to generate a bigger effect than would occur individually. Integrated capabilities are synchronized, but synchronization is not sufficient for full integration. Deconflicted capabilities are not integrated. In doctrine parlance, this is similar to the principle of Unity of Effort. However, unity of effort focuses on organizations working in tandem. Integration is about linked capabilities irrespective of the organizations that provide them.

The traditional principles of war such as mass, security, simplicity and surprise still apply. Warriors still have to identify centers of gravity (COGs) and critical vulnerabilities, for both our adversaries and the friendly forces. These COGs and vulnerabilities may exist across multiple domains. In modern warfare the requirement to operate from, within and against multiple (several) domains makes warfare very complex. While the growth in the number of domains is relatively recent the need to integrate operations from multiple domains is not. The American and the French military forces demonstrated one of the most famous examples of well-integrated multi-domain operations in the Battle of Yorktown. But in many cases MDO has not been well integrated and effects generated were less than optimal and in some cases, led to defeat like the British suffered in Yorktown. The difference today is the number of domains that exist and the complications of integrating several domains. To win in today's multi-domain environment, a military must be able to create effects in multiple domains using integrated capabilities that generate mass and surprise against multi-domain targets.

Command and control (C2) for multi-domain operations is complicated as well. Solid operational planning, a well-thought out force posture and an advance setting of the environment are needed to enable the level of multi-domain integration required to confuse and control an adversary. The war principle of simplicity becomes extremely important in MDO. The capabilities and resources provided from each domain must be well understood by the warriors. Authorities to access and execute capabilities need to be provided at the appropriate levels, often the lowest possible levels, to generate the necessary operational effects. Finally, we must be capable of generating effects from multiple domains faster and more effectively than the adversary.

If both the adversary and the US military exhibit the same capabilities, then how does one military exert its will on the other? It may come down to execution. The one that is most able to deliver mass (or more effective maneuver) in multiple domains will overwhelm the adversary. Our goal is to be a military that executes across all domains to overwhelm and enforce our will upon all our adversaries.

---

[3] Air Force Draft MDO Doctrine Note
[4] Joint all-domain command and control (JADC2) is the joint concept that MDO is tied to. It is defined for the purposes of this report as the exercise of authority, direction, and integration over assigned, attached, and supporting forces across warfighting domains and throughout the operational environment to accomplish the mission. Source is the Air Force Draft MDO Doctrine Note.

Chennault TTX 1.0 Construct

The Curtis E. LeMay Center for Doctrine Development and Education Commander directed his staff to develop and execute a series of MDO wargames, starting with a TTX, to identify seams and shortfalls between current Air Force doctrine and the doctrine required for highly-integrated, effective MDO. Over 3-4 December 2019, 164 personnel from within and outside the LeMay Center participated in Chennault TTX 1.0, at The LeMay Center Wargaming Institute, LeMay Center, Maxwell AFB. 54 participants came from LeMay Center itself, while the rest consisted of both students and staff within Air University and subject matter experts from PACAF, Headquarters Air Force (Checkmate and The Air Force Warfighting Integration Capability (AFWIC)), numerous outside units (including recent Multi-Domain Command & Control Officer - 13O graduates) and MITRE. The purpose was to survey and assess the US Air Force's ability to execute multi-domain operations in a fully integrated fashion to generate multi-domain effects. The participants, after receiving leveling briefs for half the first day, divided into eight focus groups, all trying to answer MDO-focused questions. Each group were provided a facilitator and scribe. Plus, each group had a Doctrine Development and Air Force Lessons Learned specialist assigned to it.

As the first event in the Chennault series, the TTX provided little guidance to participants. They were asked to bring their perspectives to the TTX without any restrictions. Each of the eight MDO-focused groups were asked to assess and explore the Air Force's ability to execute MDO. At the end of the TTX, each group briefed their insights to the Air University, the LeMay Center for Doctrine Development, and the Holm Center Commanders. Also observing the outbriefs were representatives from the Doctrine Development and Air Force Lessons Learned directorates. The combination of eight groups produced over 900 ideas covering a variety of topics and focus areas. However, five common topics were identified.

COMMON TOPICS #1:

- ***Interoperability and compatibility across the Air Force, joint force, OSD and our partners are required to enable MDO***
    - ***Includes classification and system standards***
    - ***Improve coordination and integration***
    - ***Demand system interoperability***

Common Topics #1 Discussion

All components of the United States Armed Forces (including the military departments as well as the national intelligence services and other defense agencies) can justify every rule set that exists with respect to systems, security and interoperability. However, if the American military truly wants to succeed against a peer adversary, we are going to have to figure out how to accept higher levels of risk to the force and risk to the mission. Otherwise the roadblocks toward improving interoperability may prove too great. The TTX participants believe an enterprise-wide review of systems and authorities (inside the Air Force, across DOD and even whole of government) is needed to ensure that acceptable risk levels are identified and applied across systems, policies procedures and authority levels. The principle of simplicity applies here. War and competition with a peer adversary will be complex. It should not be a pickup game. It is likely that indications and warnings will not provide much notice to decision makers. Systems, processes, procedures and authorities must be fine-tuned, with the focus being on quickly delivering combat capability to the combatant commander. The essential goal is simplified execution of complex multi-domain operations.

> **Interoperability and compatibility within the Air Force, between the services, functional components, combatant commands and multinational partners will require us to reassess every process rule. In other words, every rule that blocks access or delays action is driven by a risk acceptance decision. To expand interoperability and compatibility, our acceptable risk level must change across the enterprise.**

Internal processes are the cause of a significant amount of our angst. We need to significantly improve our processes and weaken classification barriers, including SAP/STO/ACCM caveats.

Systems need to talk across the Air Force, joint community and select Partner Nations (PNs). Integration needs to be improved; this does not mean deconfliction, does not even mean synchronization. It means optimizing capabilities across all domains working in concert to create effects. The joint definition of Integration is "the arrangement of military forces and their actions to create a force that operates by engaging as a whole." (DOD Dictionary) In addition, the joint community defines Interoperability as "the ability to act together coherently, effectively and efficiently to achieve tactical, operational and strategic objectives." (JP 3-0). It further defines Interoperability as "the condition achieved among communications-electronic systems or items of communications –electronic equipment when information or services can be exchanged directly and satisfactorily between them and/or their users." (JP 6-0) These definitions will help focus us as we persevere to execute MDO in an integrated fashion. Just within the Air Force, both operational and logistics platforms and systems have significant barriers to communication, in turn affecting speed of execution and speed of decision. Our current stratification may be neither adequate nor sufficient to execute MDO against peer adversaries. Whatever changes we make to our systems and processes we need to do it with our PNs in mind. Thus, Integration and Interoperability should be key objectives of any DOTMLPF-P decisions with respect to executing MDO.

The participants described how they wanted our Airmen to be enabled. They sought a common language and operational understanding of capabilities between contributors from all domains. They also desired pathways to pass MDO-related information (although they were not sure what that information might be). They wanted processes tailored to accept inputs from any domain and capable of generating MDO options to create an effect. The system must be able to handle MDO at the target level of planning and execution, and enable integrated/coordinated timing of capability delivery.

They also described what our systems must have: no barriers to communication across platforms and systems; within system agility that enables alternate procedures; within physical domain agility to continue to operate under austere and challenging conditions; systems that work well on the move and enough transparency to give units situational awareness.

Finally, this issue is really about willingness to accept risk with respect to a peer adversary. Risk acceptance must occur well ahead of execution and it has to occur across all phases of competition. If we are to be capable to fight toe-to-toe with a peer, we have to accept higher operations, force and mission risk in peacetime (phase 0, phase 1 or competition phase). Both Air Force and joint doctrine should acknowledge the changes to operations, processes and systems that need to occur to enable combat power. Doctrine should embrace processes that are resource-informed, not demand-informed. And we cannot over-emphasize that the Air Force must be ready to fight tonight.

COMMON TOPICS #2:

- *Serious education and training gaps for our Airmen*

  - *Knowledge of domains and their capabilities – especially space, cyber and EMS*

  - *Knowledge of Air Force and joint doctrine*

  - *Cross-domain operational training*

Common Topics #2 Discussion

With complicated warfare must come highly educated and well-trained Airmen. To simplify modern warfare requires warriors with a strong understanding of the multi-domain capabilities available to them, of Joint and Air Force Doctrine on how to best employ them, and of the strategic, operational and tactical effects able to be generated when they are integrated. In addition, they must understand the capabilities, limitations and the authorities required to effective employment. This requires a focused, current Professional Military Education (PME) and cross-domain operational training.

> **Well-educated and well-trained Airmen win wars. PME and operational training needs to focus on modern multi-domain operations.**

Across the groups, there was a self-assessment that knowledge of capabilities and the effects they can generate was weak in all the domains. A lot of time was spent in the groups on cyber 101, space 101, etc-type education. Our Airmen require operations-level knowledge of all domain capabilities, but especially those that the Air Force delivers. Additionally, a lack of understanding of Joint Doctrine drives a lot of misunderstanding of Air Force Doctrine. Air Force training needs to include how to integrate cross-domain capabilities to generate effects. It also needs to broaden the Airmen's knowledge and experience beyond their own tactical field of expertise. Otherwise Airmen at all levels in the heat of war will revert to what they know, which will result in stove piped operations. One area the participants cited as a gap for current Air Force and joint doctrine is how the Air Force performs global integrated operations in all domains.

Operators and planners cannot be experts in the capabilities of every domain, but they need to gain an operational knowledge beyond their own domain. This means a level of understanding that leads to application and creation of capabilities from domains outside their area of expertise to create effects. If this does not occur until after conflict starts, then it is likely too late to ensure success. The Air Force can start by populating the staffs (AOC/AFFOR/Multi-domain operations centers) with the appropriate skill sets. Tools that enable Airmen to improve their knowledge and understanding of these capabilities in the course of their normal duties are lacking. Some options may be annual or biannual on-line currency courses (such as what the medical, accounting and other professional endeavors require or open/closed book testing for rated career fields). The goal is to continue to update knowledge levels of our Airman at all experience and authority levels. Let's be clear – poorly educated and/or poorly trained Airmen will misapply capabilities or not use them, resulting in decreased ability to generate the mass needed to create operational and strategic effects. Our senior leaders may not have a good strategic or operational understanding of the effects that could be generated using an all-domain approach to warfare and fall back to what they know, which will severely limit the potential on what they can affect. It is also difficult to trust capabilities from domains that Airmen lack knowledge of. Lack of trust will lead to less-effective employment or removal from the capabilities package. Operational capabilities wasted or misused will likely result in defeat or a drawn-out engagement. Our Airmen must be ready to fight tonight.

The participants described how they wanted our Airmen to be enabled. They sought a common language and operational understanding of capabilities between contributors from all domains. They desired pathways to pass MDO-related information (although they were not sure what that information might be). They wanted processes tailored to accept inputs from any domain and were capable of generating MDO options to create an effect. The system must be able to employ MDO to find, fix, track, target, engage and assess effects for both planning and execution, and enable integrated/coordinated timing of capability delivery.

COMMON TOPICS #3:

- ■ *Favor cheaper, redundant and faster capabilities (across all domains)*
  - ■ *Quantity over quality, when it makes sense*
  - ■ *Deception techniques*

Common Topics #3 Discussion

The principle of mass in warfare is an important one. Against a peer adversary, consistently generating mass to overwhelm the adversary and change his decision calculus is very difficult. This is made more difficult when the peer adversary creates access dilemmas that must be overcome to create those effects. In such environments, simply overwhelming the adversary's defenses with technologically inferior and inexpensive capabilities can be more effective than more superior and expensive ones. In fact, a mix of such capabilities make good sense. This concept is not new and the Air Force is already attempting to identify cheaper capabilities that can be produced *en masse*. This needs to continue across all domains. Redundancy is a concept that most of the joint community moved away from in the last 20 years, as we focused on providing defense of the country in the most efficient manner. But against a peer competitor, efficiencies at the expense of effectiveness (redundancy) can carry a high price. Airmen fighting a peer competitor should expect severe attrition in all domains and plan accordingly. When fighting a peer competitor, overwhelming capability is not only preferred, it is really the only consistently successful option. The question is how to get redundant capabilities in place such that the adversary has little chance to block our ability to generate overwhelming capability. Additionally, deception techniques are able to affect an adversary's calculus and create desirable effects that may not be

> **Everyone knows the story of the Sherman tanks against the German Panzers. One-on-one they were no match. But a swarm of Shermans could overwhelm the small Panzer formations. And this is how they were employed in WWII. Shermans were much cheaper to produce so they were generated in very high numbers that the Germans could not match.**

possible with physical forces. There are a number of potential options to consider, integrated planning is essential to best synchronize capabilities to achieve the desired objective.

COMMON TOPICS #4:

■ *Seek out and develop AI/machine learning to enable MDO*

Common Topics #4 Discussion

Modern warfare being as complicated as it is, the modern Airmen need assistance to optimize MDO capabilities. This is where technology plays a role. There has been a lot of interest recently in AI. There is also a lack of understanding of what AI is and what it can do. More directly, the participants are asking for machine tools that can enable the warrior, such as for planning, execution and C2.

In determining what kind of machine assistance warriors need, it is important to note what they don't need. Machine assistance needs to be enabling, not encumbering. In other words, it must make their job easier, not harder. Machines that do not enable data input or make extraction difficult are not useful. If a machine is making decisions, what mechanism exists such that one can trust the machine with those decisions?

What are the most important questions we need to ask about AI before we develop it? What do we want the technology to do? Instead of making AI to deliver kinetic effects independent of the Airman (perhaps a bridge too far in the near term), perhaps we should seek out AI that takes more simple, mundane tasks off the Airman's plate, such that he/she can focus on their wartime tasks? The economist relies heavily on the concept of "opportunity cost." If the Airman is weighed down with mundane, none warrior-focused tasks, what is the impact on his/her warfighting capability. What tasks that the Airman performs deliver the most bang for the buck for his/her commander?

> "**In computer science, artificial intelligence, sometimes called machine intelligence, is intelligence demonstrated by machines, in contrast to the natural intelligence displayed by humans. Leading AI textbooks define the field as the study of 'intelligent agents': any device that perceives its environment and takes actions that maximize its chance of successfully achieving its goals. Colloquially, the term 'artificial intelligence' is often used to describe machines that mimic 'cognitive' functions that humans associate with the human mind, such as 'learning' and 'problem solving'. As machines become increasingly capable, tasks considered to require 'intelligence' are often removed from the definition of AI, a phenomenon known as the AI effect. A quip in Tesler's Theorem says 'AI is whatever hasn't been done yet.' For instance, optical character recognition is frequently excluded from things considered to be AI, having become a routine technology." Source: Wikipedia**

Another way AI might enable opportunity cost is to provide the C2 function a variety of multi-domain options to generate an effect and the opportunity cost of using those capabilities. The bottom line: we have to know what capabilities we want from AI to use it effectively.

COMMON TOPICS #5:

- ■ *Develop agile combat employment that enables ability to survive and operate*

Common Topics #5 Discussion

There is a LeMay Center warrior who is famous for saying "where is our Kaliningrad?" The concept inherent in that statement is simple; where is our capability to defend our bases of operation such that significant combat capability continues after attack? Our peer adversaries have developed the capability to reach out to our air bases and deliver significant firepower in the form of ballistic missiles and cruise missiles. Long-range precision ISR enables those weapons to create devastating effects against our bases. These capabilities have the effect of forcing us to base further away, impacting our ability to deliver mass capabilities that enable overwhelming effects against our adversaries. A lot of work has already been done in this area, but the participants in the TTX saw this as an important topic that affects our ability to execute MDO.

In the Cold War, American forces in Europe expected to deliver capabilities in very trying conditions. The concept was known as ATSO, or *Ability to Survive and Operate* and every Airman trained under those conditions. Significant capabilities resided in the logistics force to maintain airfields and keep runways operational. This type of capability is again needed today.

Other Topics

Other topics the participants discussed covered a wide range. For example, some participants were unable or unwilling to separate MDC2 from MDO, even though the guidance they were given asked them to do so. They recognized the need for a robust communication network – perhaps designed as a mesh network employing Internet Protocol (IP) technologies. They also sought a focus on C2 policies, processes, methodologies and training to enable MDO capabilities and effectiveness. This includes properly resourcing existing C2 organizations (AOCs). They also desired C2 capability that could identify and pivot to an adversary's weak points, creating multiple dilemmas. This might occur at the service, joint or whole-of-government level.

They recognized that MDO was not a pick-up game. Therefore, Air Force needs to upgrade deliberate MDO planning and training (recommended Flag Multi-Domain Exercise). Air Force MDO Doctrine needs to be developed in a joint context. It also needs to be global in its application. Participants desired numerous changes to doctrine, including the establishment of a common language (already a function of doctrine but needs upgrading). Additionally, they desire task allocation process that allow the task owners to push back, new processes for identifying targets, and planning and execution of the same. They also expressed a need to address the flow of operations (phasing), develop interim work arounds while corporate Air Force develops new people, processes, technology and products, redefine the definition of a "target," relook at expectations, responsibilities and authorities to develop strategic guidance for all domain nodes at lower levels of activity. Finally, they desired doctrine to address risk to mission for engagements with peer adversaries.

Some participants desired a new strategic perspective. They were looking for a different way to address Ends, Ways and Means. For the Ends, they are looking for effects that result in less than unconditional surrender, a regional conflict "win" or providing an impetus to escalation. For the Ways, they identified capabilities that employ multiple avenues of approach against COGs, critical capabilities and vulnerabilities. They acknowledged their lack of knowledge and awareness for these types of capabilities. For the Means, they desired to move away from stove piped thinking and processes.

Improving IO capabilities was favored by some participants, but there is very little understanding of the Air Force's role in IO and what capabilities resided in the service, likely due to security

compartmentalization. There was also a desire to make every air-breathing and space platform a sensor, reducing the need for high-value ISR assets, also taking away a critical vulnerability from our adversaries. An increased capability for shared situational awareness across platforms with multi-level security options would provide greater integration of the increased sensor pool. Some participants also wanted to reduce our dependence on GPS. They suggested aviators be provided a celestial navigation app. Some sought increased global kinetic and non-kinetic capabilities that improved our capability to create effects from long distances. The goal was to increase cost and risks for our adversaries at very low cost to us, with direct impact on their decision calculus, thus improving deterrence. Some participants saw a need for composite wings designed for MDO, enabled with mission-type orders and kill boxes. In space, the participants suggested greater analysis of commercial space capabilities with definitive choices need to be made over how they will be treated in war. It is almost impossible to blind an adversary today.

The participants noted that partnership with other nations should be an Air Force core function.[5] Today, the Air Force has a robust Security Cooperation Program. It seeks to enable our partners to operate successfully within a coalition and to be able to provide a robust air force capability. It focuses on the air, space and cyber domains.[6] To create multiple dilemmas for our adversaries, we need to significantly improve our PNs' self-defense, interoperability with us and help robust their infrastructure (SCADA), all to the goal of strengthening deterrence.

There was concern whether current organizational structures enable MDO. Specifically, in the joint community, some questioned whether geographic combatant commands (GCCs) are the best structure for a multi-domain fight. They also questioned whether the Air Force MAJCOMs are the right structure to provide MDO capabilities. Still others questioned the current Chain of Command from the POTUS/SECDEF through the CJCS to the GCC with supported and supporting relationships are adequate to execute multi-domain missions against a peer adversary. In other words, they saw a fight with a peer as a global fight requiring global situational awareness. Right now, that can only happen at the JCS level.

Participants noted the challenge for the Air Force to attract and keep talented non-kinetic operators. They suggested the use of commercial operators and even suggested exploring the use of Privateers.

---

[5] *Building Partnership Capacity* was once an Air Force Core Function and part of the Air Force Core Function Master Plan. It was removed in 2012. DODI 5100.01 directs all the services to provide forces to enhance military engagement, conduct security cooperation, build the security capacity of partner states, and deter adversaries to prevent conflict. (see Enclosure 6, para 1.b(9), p26)
[6] "*Security Cooperation With The United States Air Force*", September 2016, SAF/IE, p4.

Way Ahead

TTX 1.0 was the first in a series of events intended to inform future MDO doctrine. The intent is to use each subsequent event as a building block for future events. As such, The LeMay Center will execute TTX 2.0 from 11-13 FEB 2020, with a focus on the targeting process within the AOC. This will allow for scrutiny of the integration of space, cyber, and EMS alongside kinetic targeting practices. The results from this event will inform future events focused specifically on Space, Cyber, EMS, and the TACS construct. All lessons will culminate in a major wargame during the summer of 2021. The goal of the wargame and the TTX series are to identify alterations to be made to the processes and products generated within the AOC which will facilitate a more synergistic effort and reduce the amount of time required to execute effectively.