FLEXIBLE EMPLOYMENT OF MULTIROLE ASSETS

Trevor A. Gustafson, Major, USAF

WRIGHT FLYER PAPERS

Air Command and Staff College

Evan L. Pettus, Brigadier General, Commandant
James Forsyth, PhD, Dean of Resident Programs
Paul Springer, PhD, Director of Research
John Terino, PhD, Essay Advisor

Please send inquiries or comments to

Editor
The Wright Flyer Papers
Department of Research and Publications (ACSC/DER)
Air Command and Staff College
225 Chennault Circle, Bldg. 1402
Maxwell AFB AL 36112-6426

Tel: (334) 953-3558
Fax: (334) 953-2269

E-mail: acsc.der.researchorgmailbox@us.af.mil

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TREVOR A. GUSTAFSON, Major, USAF

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Muir S. Fairchild Research Information Center
Maxwell Air Force Base, Alabama

Commander, Air Command and Staff Colleges
Brig Gen Evan L. Pettus

Director, Air University Press
Dr. Mehmed Ali

Project Editor
Kimberly Leifer

Copy Editors
Courtney Lane
Holland Luckie

Illustrator
Daniel Armstrong

Print Specialist
Cheryl Ferrell

Air University Press
600 Chennault Circle, Building 1405
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Foreword

It is my great pleasure to present another issue of The Wright Flyer Papers. Through this series, Air Command and Staff College presents a sampling of exemplary research produced by our resident and distance-learning students. This series has long showcased the kind of visionary thinking that drove the aspirations and activities of the earliest aviation pioneers. This year's selection of essays admirably extends that tradition. As the series title indicates, these papers aim to present cutting-edge, actionable knowledge— research that addresses some of the most complex security and defense challenges facing us today.

Recently, The Wright Flyer Papers transitioned to an exclusively electronic publication format. It is our hope that our migration from print editions to an electronic-only format will foster even greater intellectual debate among Airmen and fellow members of the profession of arms as the series reaches a growing global audience. By publishing these papers via the Air University Press website, ACSC hopes not only to reach more readers, but also to support Air Force–wide efforts to conserve resources. In this spirit, we invite you to peruse past and current issues of The Wright Flyer Papers at https://www.airuniversity.af.edu/AUPress/Wright-Flyers/.

Thank you for supporting The Wright Flyer Papers and our efforts to disseminate outstanding ACSC student research for the benefit of our Air Force and war fighters everywhere. We trust that what follows will stimulate thinking, invite debate, and further encourage today's air, space, and cyber war fighters in their continuing search for innovative and improved ways to defend our nation and way of life.

EVAN L. PETTUS
Brigadier General, USAF
Commandant

Abstract

Improvements in technology require improvements in doctrine and training. In combining assets into multirole platforms, mission requirements should also combine, to allow for full utilization of assets. Current airpower systems are lacking in flexibility because of antiquated doctrine and a disconnect between missions sets of data collection and strike capabilities. This paper argues that the processes governing these platforms be consolidated into a single process that leverages and optimizes both roles.

Introduction

Primer

In 1936, Royal Air Force officer JC Slessor published *Air Power and Armies*, which named airpower as the most revolutionary advancement in war up to that time.[1] The advent of this new technology and the ability to fight above the surface forever redefined the contemporary concepts of waging war. In 2016, Thomas Friedman's *Thank You for Being Late* explained that technology advances at an exponential pace called Moore's Law.[2] For the first time in history, human adaptability was unable to keep pace with technological advancement.[3] A year later, a RAND Corporation report stated, "US forces could, under plausible assumptions, lose the next war they are called upon to fight."[4] Finally, in 2019, retired General David Petraeus stated the United States had entered into the "early stages of a tech cold war."[5] These four seemingly separate points define the critical position that the United States finds itself in today. Technological advancement is altering the employment of airpower, and the country that can fuse new technology with organizational reforms and innovative operating concepts will dominate the future information-centric battlefields, and perhaps unlock the next Revolution in Military Affairs (RMA).

From its inception, airpower provided warfare with a new arena in which to conduct operations. Early airpower allowed enhanced observation, targeting information, and reconnaissance. This ability to reach the ultimate high ground and provide battlefield clarity was the precursor to the modern airpower role of Intelligence, Surveillance, and Reconnaissance (ISR).[6] Over time, the desire for a separate, independent US Air Force led airpower advocates to emphasize airpower's kinetic potential at the unintended consequence of subordinating the ISR mission.[7] This emphasis on strike operations created a chasm between the mission sets that will be untenable in future conflicts because of resource constraints, mission requirements, and wars conducted in highly contested environments against technologically-advanced adversaries.[8]

Thesis

This research attempts to solve one major problem with airpower employment: the effective tasking of multirole aircraft, defined as platforms capable of conducting ISR and strike missions on a single sortie. Antiquated doctrine, separate targeting processes, and a century of division between the

mission sets of ISR and kinetic strike operations inhibit such efficiencies. To utilize multirole aircraft to their full capability, current kinetic targeting and ISR collection processes should consolidate into a single process leveraging advanced Artificial Intelligence (AI) to produce an optimized Integrated Tasking Order (ITO).

Outline

This paper's thesis is supported primarily through an examination of the future realities of wars. As the National Security Strategy and the National Defense Strategy shift priorities from the low-tech adversaries of the Middle East to the near-peer competitors of China and Russia, war strategies will be required to shift also. Future airspace is predicted to be highly contested and may require nontraditional ISR platforms with survivability, stealth, and defenses to conduct Intelligence Preparation of the Operational Environment (IPOE).[9] Without proper doctrine and processes in place, the US military will be ill prepared to fight against a technologically advanced adversary.

US fiscal constraints will also produce fewer single-role, specialized aircraft, thereby necessitating a procedural change to allow multirole aircraft to perform multiple and nontraditional missions. Air power advocates have historically prioritized kinetics over ISR.[10] Altering this cultural inertia will require a paradigm shift.

An examination of the current kinetic and ISR targeting processes will establish the division between the mission sets that will require solutions to bridge the divide. Three key issues within the targeting doctrine create barriers to multirole tasking. Additionally, there are six recommended changes to the targeting doctrine to merge specific segments of the kinetic and ISR targeting processes. Finally, an AI tool named Multi-Domain Integrated ISR (MDI2) should be integrated into the process to optimize and expedite the tasking decisions. The implementation of the six recommended changes with MDI2 will produce a streamlined targeting process capable of flexibly tasking all multirole aircraft.

Future Contested Wars

Near-Peer Battlefields

The United States continues to modernize its military based on a series of obsolete assumptions about how future conflicts will transpire. The US

assumes that wars will commence at a time of its choosing, in permissive environments, and against adversaries that are powerless to prevent freedom of maneuver in any domain. The US military presumes it can overcome any quantitative disadvantage it may face through superior technology that will penetrate enemy defenses undetected and strike targets, all with minimal combat losses.[11] With these assumptions guiding weapon system development, the current Air Force consists of minimal technologically advanced, expensive, and multirole platforms that are difficult to replace.[12] China and Russia are "employing layers of antiaccess and area-denial (A2/AD) systems" to achieve physical standoff capabilities. A2/AD allows adversaries to harden their regional spheres of influence, and, if necessary, rapidly inflict unacceptable losses faster than the United States can effectively respond.[13] The United States needs to assume that future conflicts will be held in highly contested environments against technologically advanced adversaries with high combat losses.[14] Using this perspective, the United States must leverage the fighting force it has already developed and innovate through the development of a flexible air tasking mechanism that utilizes the full capability of all platforms. For strike targets and intelligence collection needs, the ability to re-task and multi-task assets is a crucial transformation to counter future adversaries.

Nontraditional ISR

At the onset of future hostilities, airspace may not be permissible to traditional ISR platforms. The only means to establish the IPOE may be through tasking ISR-capable fighters to conduct ISR primary or additional missions. Until air superiority can be gained and maintained, much of the US air-breathing ISR fleet will be grounded, and the dearth of information will be because institutionally accepted processes prevented every aircraft from being employed as an ISR node.

Nontraditional ISR (NTISR) is the concept of "employing a sensor not primarily used for ISR as part of an integrated collection plan, developed at the operational level, for preplanned, on-call, ad hoc, and/or opportune collection."[15] During Operation Iraqi Freedom (OIF) in 2002, planners coined the term NTISR as fighter aircraft began using their targeting pods on the way home from kinetic missions to support Counter SCUD operations and observe Iraqi security force positions.[16] The deputy chief of collections management at the Combined Air Operations Center stated, "before NTISR, we had fighter aircraft with surveillance capabilities burning holes in the sky, just waiting to be tasked by ground commanders. Instead of wast-

ing these resources, we've begun to use them to fill some of the gaps in our traditional ISR operations."[17] NTISR was so "successful that it was a revelation," however, the new function also underscored how disconnected US aircraft had become from battlefield situational awareness.[18] The imagery from the synthetic aperture radar and targeting pod could not be fed directly to analysts on the ground; most of the sensor information was internal to the aircraft and not even recorded.[19] Despite NTISR beginning to prove its worth during early OIF operations, Combatant Commanders still mandated that multirole Remotely Piloted Aircraft (RPAs) perform ISR missions exclusively to save manned fighter aircraft from the wear and tear of long ISR sorties.[20] The Air Operations Center (AOC) still treated multirole aircraft in terms of either strike or ISR assets and rarely attempted to integrate the two missions.[21]

Fiscally Constrained Force

Defense Budgets

Despite outspending Russian military forces by a ratio of 6 to 1 and China by 2.7:1, the United States remains in a renewed era of great power competition with its adversaries leading the development of the next generation of military technology.[22] Paradoxically, the DOD faces fiscal constraints despite historically massive annual budgets. In FY20, Congress appropriated $704.6 billion for defense, and the President sent a $705.4 billion request for FY21.[23] These amounts dwarf all foreign military competitors, as well as entire economies of several large countries. The FY21 budget request justifies this amount by asserting it fostered "numerous hard choices."[24] Specific to the Air Force, a recent Deputy Assistant Secretary for Budget observed that, when preparing for FY19, the Air Force "had more money than last year, but more problems."[25] In short, there are more requirements than resources, even if current resources continue to represent a substantial comparative advantage.

Multirole Aircraft Inventory in Single-role System

The problem with the US defense budget is not insufficient funding, but rather adversaries countering US weapon systems with superior strategies: "Put simply, US rivals are fielding large quantities of multimillion-dollar weapons to destroy the United States multibillion-dollar military system."[26] Innovative strategies from peer competitors are quickly closing the asymmetric capability gap the United States has enjoyed for decades. Perhaps

even more alarming is the lengthening US acquisition cycle that, when coupled with a requirement-resource mismatch, is making it increasingly challenging to develop or augment weapon systems. This situation triggered recent Air Force budget preferences favoring platforms capable of fulfilling multiple roles instead of specialized platforms.[27] Thus, the future of US air warfare is a fighting force with less mass and a need for greater multitasking. The Air Force must develop the proper doctrine, processes, and programs to empower the multirole aircraft inventory it created to achieve national objectives. Every aircraft is a potential ISR asset, and the organization capable of collecting, synthesizing, and responding quicker than the adversary is likely to prevail. By leveraging information superiority through innovative operating concepts, Combined Force Air Component Commanders can more accurately and rapidly complete their decision cycle to gain the advantage.

Current Targeting Processes

Kinetic Strike Targeting Process

Joint doctrine outlines separate ISR and Operations targeting processes and forms the foundation for the continued divergence of mission sets and discouragement of integration. The kinetic targeting process begins with Joint Force Commander (JFC) guidance to the Joint Force Air Component Commander (JFACC) through the Air Operations Directive (AOD).[28] The AOD also includes the JFC's air apportionment decision, which is the priority or percentage of effort devoted to each campaign objective. Guidance from the AOD begins the process to develop and prioritize the Joint Integrated Prioritized Target List (JIPTL). The JIPTL is a list of targets selected for kinetic or non-kinetic destruction.[29] The Targeting Effects Team (TET) in the Combat Plans Division (CPD) of the AOC develops and prioritizes the JIPTL using strategy-to-task mythology that links each target directly to a JFC campaign objective.[30] The targets are prioritized based on their associated prioritized tasks and criticality to the overall joint campaign.[31] The JIPTL is then approved by the JFC at the Joint Targeting Coordination Board and provided to the Master Air Attack Plan (MAAP) team for force allocation. The JFACC determines the air allocation by translating the JFC's air apportionment decision into the total number of sorties by weapon system. The MAAP team matches the air allocation sorties to the targets on the JIPTL. The final result is the MAAP that forms the foundation of the Air Task Order (ATO).[32]

Collections Targeting Process

The Joint Integrated Prioritized Collection List (JIPCL) is a list of targets for intelligence collection and is developed separately from the JIPTL in a process that prevents efficient use of assets that could address targets on both lists. While the CPD develops the JIPTL, the ISR Division (ISRD) of the AOC develops the JIPCL with minimum coordination between divisions.[33] According to joint doctrine, allocating wartime ISR assets starts with the commander's critical information requirements (CCIRs).[34] CCIRs are information requirements that the commander identifies as being critical to facilitating timely decision-making.[35] The most critical intelligence requirements are designated as priority intelligence requirements (PIRs) and receive increased levels of support along with priority in the allocation of assets. ISR missions collect essential elements of information (EEIs), which, in turn, answer PIRs. EEIs are subsets of information that fill a gap in the command's understanding of enemy activities and other relevant aspects of the operational environment.[36]

The collection manager within the ISRD converts EEIs into a list of collection targets known as the JIPCL.[37] The JIPCL also includes the collection requirements necessary to support strike operations.[38] The JIPCL is reviewed by the Joint Collection Management Board (JCMB), which serves as a mechanism to prioritize, combine, and approve the intelligence needs of the JFC. Once collection requests are prioritized and approved by the JCMB, subject matter experts within the ISR operations team develop a collection plan that tasks ISR assets to satisfy targets on the JIPCL in an attempt to answer as many EEIs for priority requirements as possible.[39] ISR planners fulfill requirements by allocating a percentage of available collection assets to the number one priority target, a lower percentage to the number two priority target, and so on until either all the possible collections are planned, or there are no remaining assets to task. The ultimate output of this process is the Reconnaissance, Surveillance, and Target Acquisition (RSTA) Annex that documents the final collection plan and becomes part of the ATO.[40] Figure 1 graphically depicts the kinetic and ISR targeting processes.

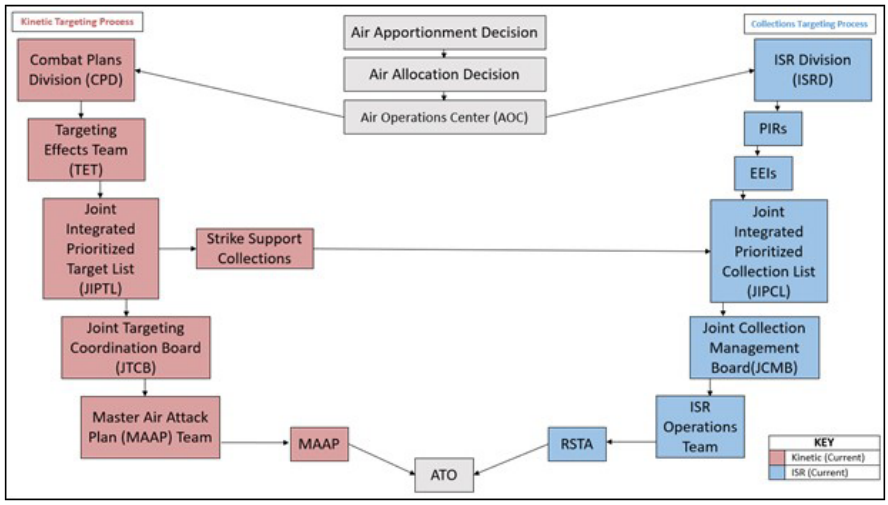

Figure 1. Kinetic and ISR Targeting Process

During the planning phase of ISR operations, the collection manager has the difficult job of determining the proper asset for collection against a target while considering numerous variables. These variables include considerations such as weather, timeliness, priority, enemy defenses, geography, and range to target. Targets or requests that receive a low priority in the JIPCL may simply fall off the list because of a lack of assets available to address those targets. For example, during OIF, bomb damage assessment (BDA) was given a low priority during combat operations. This resulted in very few fulfilled BDA collection missions.[41] At the conclusion of major combat operations in Iraq, headlines boasted that unprecedented situational awareness had been achieved by new sensor technology able to paint the clearest picture of the battlefield in history. However, tactical commanders still relied on movement-to-contact and armed reconnaissance to gain an understanding of the adversary in front of their forces.[42] Senior US Air Force leaders claimed the lack of BDA and reconnaissance was because of a shortfall in ISR assets, rather than an ineffective ISR targeting process and prioritization.[43] In truth, an ineffective ISR targeting process failed to optimize ISR and multirole platform performance, and tactical commanders were forced to use World War II-era tactics as a consequence.

Current Process Shortfalls

Separate Target Lists

The JIPTL and JIPCL follow different development and approval routes through the AOC and both present three specific problems to multirole tasking. First, there is no doctrinal mechanism that combines and prioritizes the kinetic, non-kinetic, and collection requirements into a single prioritized list, such as a Joint Integrated Prioritized Effects List (JIPEL).[44] Without a comprehensive list, planners are unable to determine if a kinetic or collection target has higher priority and, consequently, cannot determine which should receive the higher demand weapon system. Instead, the JFACC allocates aircraft to either ISR or strike missions, and there is minimal coordination between AOC divisions.[45] While joint doctrine encourages close coordination between target and collection lists for efficiencies, in reality, coordination only occurs when a kinetic strike requires prestrike collection, post-strike collection, or BDA.[46] Additionally, if one division receives an excess allocation of aircraft, it will likely match those aircraft to lower priority targets on their list rather than coordinating with another division to make those platforms available for higher priority targets on their list.[47] This pitfall reinforces the need for a combined targets list to ensure planners always address the highest priority targets, regardless of which list they reside on.

Multirole Tasking Mechanism

An additional problem derives from the lack of a doctrinal mechanism that allows multirole aircraft to perform both kinetic and ISR missions on a single sortie. When the MAAP team is assigned aircraft, planners match those assets to kinetic targets. The same is true for assets assigned to the ISR operations team; planners match those assets to intelligence collection requirements. There is no formal mechanism to allow MAAP and ISR planners to communicate and coordinate multirole missions.[48] Multirole aircraft are capable of dropping their munitions and then transitioning into an ISR mission. If the MAAP team and ISR operations team were combined in the AOC under the CPD and produced an ITO instead of an ATO, both communities could share multirole assets to accomplish additional missions.[49] For example, the MQ-9 Reaper is an ISR platform that possesses a combat load comparable to an F-16.[50] Utilizing the MQ-9 to attack a target and then proceed to a collection mission benefits both communities.

Target Locations

Finally, there is no doctrinal mechanism or product that geographically depicts kinetic targets in relation to collection targets. Increased coordination between the Force Enhancement Cell of ISR operations and the Force Allocation Cell could enhance the understanding of the kinetic target locations relative to collection targets.[51] A geographic understanding of all target locations is critical to enable multirole platforms with the goal of addressing multiple targets and roles during a single sortie. Multirole aircraft can collect or attack targets near their flight path or in proximity to their primary target. Without a clear understanding of all target locations, taskings lose efficiency.

Figure 1 illustrates the clear divide between strike and ISR targeting processes. The CPD strike support collection requests are one of the few cross-division communication mechanisms that doctrine specifies. Even then, this communication appears limited to the CPD pushing their strike collection requirements to the ISRD for fulfillment in the manner the ISR operations team deems fit.[52] Multirole tasking will never be successful with separate targeting processes, including different prioritization schemas. The only way to properly task multirole assets is for one team to have the ability to coordinate the tasking of all available aircraft to all targets. To achieve multirole tasking, the chasm between strike and ISR communities must disappear.

Recommendations

Joint Integrated Prioritized Effects List (JIPEL)

To effectively task multirole platforms and address the doctrine problems identified earlier, implementing the following changes will combine specific segments of the targeting and collection process.

Planners need to consolidate all kinetic, non-kinetic, and ISR collection targets into a single list called a JIPEL. Separate JIPTL and JIPCL prevent multirole tasking and battlefield situational awareness. To facilitate the combined JIPEL, planners must prioritize collection targets using the same strategy-to-task methodology as kinetic targets.[53] Utilizing the same priority schema allows for the consolidation of the JIPTL and JIPCL into a single list that will display how collection targets measure in importance to kinetic targets. The ISRD will still independently produce EEIs that will translate into collection targets, however, ISR planners would have the ability to prioritize collection targets using the same methodology as strike targets.

A single prioritized target list is the first step in merging the kinetic and collection communities. The JIPEL will enable planners to task assets efficiently and address the highest priority targets first using any weapon systems at their disposal.

Joint Collection Targeting Cell (JCTC)

To consolidate and prioritize all targets and collections into a JIPEL, a new combined team will need to be formed. This new team, the JCTC, will be made up of ISR personnel from the ISRD and kinetic targeting personnel from the TET. Proper prioritization of targets can only occur with experts from both the collections and kinetic targeting communities working together. The JCTC can be placed under the CPD in the AOC or simply formed as a joint strike-ISR tiger team but experts from both communities must arrive at the JCTC with a prepared list of their targets and recommended prioritizations. The goal of the JCTC is to produce a single prioritized target list that can flow through the rest of the targeting process and allow multirole taskings.

Targets and Collection Orientation (TACO)

The JCTC will not only produce the JIPEL but will also construct a TACO graphic. This graphic will depict the physical location of all kinetic and ISR targets in the area of operation. ISR operations planners and the Force Allocation Cell have the proper understanding to develop such a graphic.[54] Using this product, downstream planners gain the ability to task multirole aircraft with secondary and tertiary targets with as little disruption as possible to the primary mission.

Joint Targeting Approval Board (JTAB)

Fourth, once the JCTC produces the JIPEL, a combined JTAB will approve the targets and prioritization. A merged JIPEL no longer requires separate approval boards. A single approval board provides the JFC and JFACC a single frame of reference when approving target prioritizations. As operation priorities shift between combat and ISR, senior leaders and planners can easily visualize which type of targets are being prioritized and identify the targets most likely to be affected. If planners have incorrectly interpreted the commander's intent, leaders can course-correct before aircraft assignment and assess inconsistencies prior to publishing an ATO with the incorrect weight of effort assigned toward campaign objectives. Ulti-

mately, the JTAB increases efficiency, eliminates redundancy, and enhances the situational awareness of commanders.

Joint Effects Team (JET)

The next change occurs directly after JTAB approval. Once the JIPEL is approved, members from the MAAP team and ISR operations team will meet to assign aircraft to targets. This new team will be called the JET. By having both communities represented in the JET, platforms typically allocated to ISR or strike missions can be assigned as nontraditional strike assets or with secondary missions. The JET directly effectively rectifies the issue of tasking multirole aircraft with multiple missions on a single sortie. Utilizing the JIPEL and TACO, JET planners can effectively task any aircraft to accomplish the highest priority targets first and then, as necessary, to roll aircraft into secondary missions either near their primary target or the egress route. With JET planners having access to all aircraft, they would be able to ensure the best aircraft-to-target pairing. Additionally, planners will have the situational awareness to potentially task a single multirole aircraft to accomplish what previously would have required several aircraft to achieve. The situational awareness realized by understanding all target prioritizations and locations will enable operations to service more targets while utilizing the full potential of multirole aircraft.

Master Air Operations Plan (MAOP) / Integrated Task Order (ITO)

The final recommended change is to develop a combined MAOP that leads to an ITO. Current processes produce a MAAP for kinetic targets along with an RSTA Annex for collection targets after the MAAP team while ISR operations team accomplish their respective weaponeering. This separation is no longer necessary with the JET accomplishing the combined weaponeering of all platforms. Therefore, for efficiency and simplicity, the MAAP and RSTA Annex are merged into a combined MAOP, which will ultimately produce the ITO.[55] Figure 2 depicts the new proposed combined targeting process in relation to the existing targeting processes.

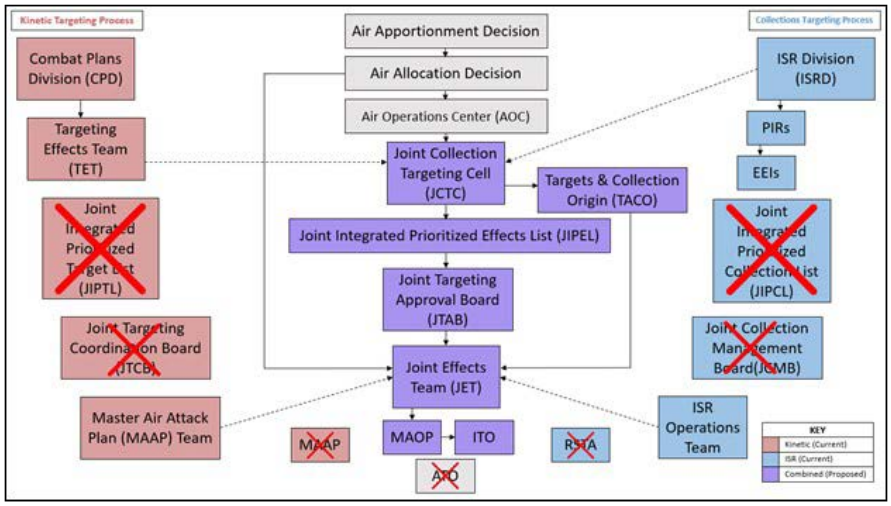

Figure 2. Proposed New Combined Targeting Process

The purpose of these six recommended changes is not to allow the ISR community to appropriate traditional strike assets, but rather to allow all multirole platforms from both communities the flexibility to execute missions efficiently. An MQ-9, for example, can conduct a kinetic strike on its way to an ISR Combat Air Patrol (CAP). Similarly, a manned multirole fighter can conduct a nearby secondary mission of BDA, which prevents an ISR asset from having to fly that same distance for a quick ISR mission. Ultimately, combining the strike and ISR targeting processes allows for better control and flexibility over the entire system. Members of the JCTC and JET will become experts in the employment of multirole platforms and holding targets at risk through various options. As the US military moves toward a Combined All-Domain Command and Control (CADC2) concept, planners will be tasked with the responsibility of coordinating much more than just a merged strike and ISR process. Eventually, the military will need to develop a system that merges cyber, space, and other capabilities into the targeting process. This proposed combined targeting process can expand to include these additional warfighting domains.

Multi-Domain Integrated ISR

With the merging of kinetic and ISR targets and processes, information overload is a genuine concern. Major General Chance Saltzman, deputy commander for US Air Forces, Central Command, stated that one of the signifi-

cant obstacles in the AOC is sorting through the massive amount of daily information and intelligence promptly to respond to threats and opportunities before they disappear.[56] To overcome information overload, the Air Force Research Laboratory (AFRL) is developing a Multi-Domain Integrated ISR (MDI2) program that seeks to build tools, systems, and processes that better support the true integration and fusion of data across domains and intelligence sources. MDI2 promotes real-time situational awareness by providing all users with all the pertinent information in a digestible format that does not overload the human decision maker.[57]

MDI2 consists of four programs, Sphinx, Hydra, Cerberus, and Kraken that work in concert throughout the targeting process to optimize asset-to-target selection, flight path planning, multirole tasking, and dynamic re-tasking.[58] To begin, Sphinx addresses the lack of collaboration, standardization, and feedback in the targeting process. This system develops, evaluates, and tracks information requirements that drive collections and provide a closed feedback loop on requirements satisfaction. Next, Hydra provides ISR collection planners with a decision aide to optimize asset allocation and path planning. Historically, thirty percent of ISR collections go unsatisfied because of suboptimal tasking solutions.[59] Hydra will utilize learning algorithms to identify an optimal path while adapting to dynamically changing environments at a higher level of performance than a human expert. These algorithms have already been proven to provide optimized recommendations in under a second in comparison to a human expert who generally takes over an hour.[60]

Cerberus is a real-time display that provides planners with the ability to monitor and dynamically re-task assets. Cerberus will generate courses of action with gain/loss analysis for ad hoc tasking in response to changing conditions. Even decisions made by informed personnel have a personal bias that can create less than ideal decisions and trade-offs. Cerberus would create suggested actions based on real-time asset allocation and consequences of reallocation.

Kraken is a system that can track and identify the best capability to satisfy the collection requirements. Kraken will feed into the other three programs to enable Sphinx to determine available assets, Hydra to utilize the optimal asset while creating the asset allocation plan, and Cerberus to calculate the gain/loss of asset reallocation.[61]

New Combined Targeting Process

To properly integrate MDI2 into a merged kinetic and ISR targeting process, MDI2 must receive the proper inputs. MDI2 will utilize three products from the new combined targeting process: the air allocation decision (which determines the aircraft available to be tasked), the target priorities in the JIPEL, and the TACO (which depicts the location of all targets). MDI2 then develops an optimal solution or multiple solutions based on the three products and other limitations as required. The MDI2 optimized solution is selected, validated by the JET, and ultimately becomes the MAOP. Without the aid of technology, generating these daily solutions by human experts will not produce the desired efficiencies. Figure 3 shows the integration of MDI2 into the new combined targeting process.

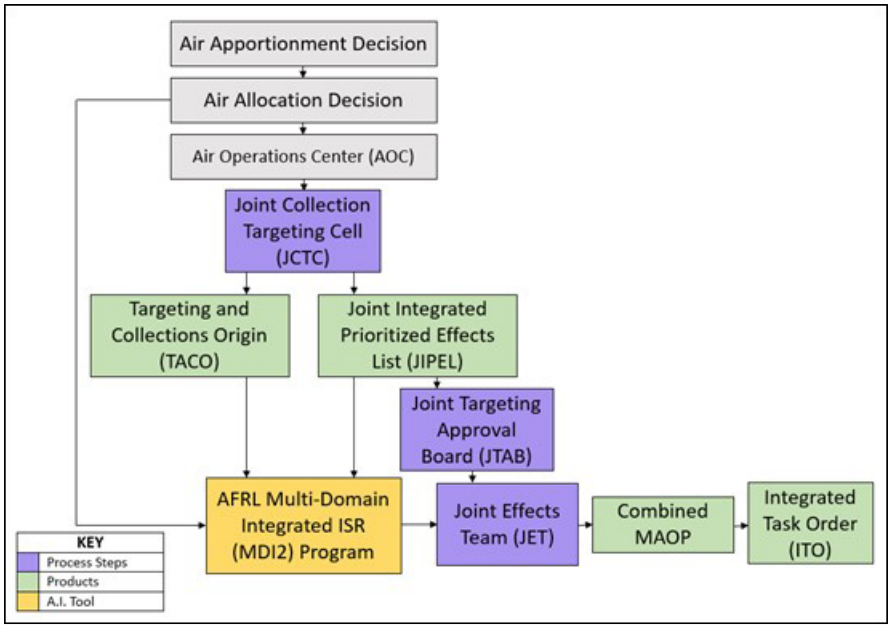

Figure 3. New Targeting Process with MDI2 Incorporated

In rapidly changing combat environments, humans are not able to assimilate the thousands of variables to create optimal solutions in the required time. MDI2 will filter the information and present the human decision maker with concise solutions that take into account all variables such as target priorities, target locations, refueler tracks, flight paths, and threats.[62] In *Thank*

You for Being Late, Friedman states, "machines are now able to absorb and process data at previously unimagined rates and amounts, they can now recognize patterns and learn much as our biological brains do. Those who can analyze massive amounts of data will be able to spot trends that could never have been seen before."[63] AI allows for quicker and optimized decision making. Optimized solutions afford additional capacity for platforms to cover more roles in a single mission. Doctrine and processes can be improved to encourage the integration of target development, but these improvements alone are not enough to achieve multirole tasking. AFRI's MDI2 program shows promise in achieving the command and control efficiencies required to complete the complex taskings to win tomorrow's wars.

Conclusion

Fiscal constraints will likely produce a future US aircraft inventory with fewer specialized aircraft capable of only a single mission. Additionally, future battlefields will continue to be information-centric but highly contested environments that may not allow typical ISR platforms to survive. Nontraditional ISR assets, such as the F-35, may be the only option to collect ISR on disputed battlefields. Using these fiscal and battlefield realities as a guiding beacon, the US air forces must adapt and innovate to continue domination. With these adaptations, planners must utilize each multirole aircraft to its fullest extent. Every aircraft is a potential ISR sensor and must be able to collect and fuse intelligence in near real time.

Improving doctrine and advocating for multirole taskings will only be as successful as the training. Fortunately, the US Air Force's Exercise Red Flag is already successfully demonstrating the multirole concept.[64] The F-16CM is a Suppression of Enemy Air Defense (SEAD) dedicated aircraft. At Red Flag, the F-16CM routinely trains to strike its target and reset to a SEAD CAP to support follow on dynamic taskings.[65] This training is similar to the tasking of a multirole fighter or RPA conducting a kinetic strike and reset to an ISR CAP. In January 2018, the MQ-9 conducted successful proof of concept trials by dividing on station time into distinct periods for ISR and Close Air Support (CAS). Several missions validated the concept and demonstrated near-seamless integration of multiple mission types in a single sortie. Furthermore, testing proved that an MQ-9 could flow between ISR and strike operations control, effectively satisfying ISR needs while engaging and eliminating four targets during a single sortie.[66] Successful training during Red Flag and MQ-9 trials validate the concept of tasking multiple missions on a single sortie. The only remaining obstacle blocking kinetic

and ISR integration is outdated doctrine and cultural ignorance that views ISR as a separate and subordinate mission to strike capabilities.

Opponents to multitasking aircraft may argue that manned fighters will now have to operationally plan for secondary missions that could impact the probability of success in achieving the primary objective. While this argument has merit, the creation of a TACO graphic mitigates this impact by ensuring all target locations are taken into consideration when tasking aircraft with secondary missions. Additional targets should be proximal to the ingress or egress routes or near the primary target location. Aviators have also voiced concern over losing proficiency in their primary mission and the rapid aging of aircraft through additional ISR flight hours.[67] Again, these are valid concerns, however, this new tasking process seeks efficiencies in tasking aircraft against the most advantageous target rather than abusing multirole aircraft on low priority, long-dwell ISR missions. Most long ISR missions will still fall on RPAs. Nevertheless, if a high priority ISR target is only reachable with a manned fighter aircraft, it will be advantageous to maintain the ability to task traditional strike aircraft to fly the mission. This new tasking process empowers multirole fighters to accomplish numerous missions on a single sortie in a noninvasive manner without impacting future sortie generation.

By managing the planning and execution processes associated with these low-density, high-demand assets more efficiently, the warfighter will be able to make the best use of these scarce resources. Instituting a new combined kinetic and ISR targeting process will have many challenges to overcome. Cost, however, is a challenge this solution easily surmounts. AOC reorganization, personnel training, and integrating an already funded MDI2 program will have no significant cost.[68] The improvements to efficiency should produce cost savings through reduced sorties in addition to purchasing fewer aircraft. Nevertheless, any associated costs will be well worth the price to forge a more dynamic and unpredictable air fighting force.

The challenges of this new targeting process involve understanding the strengths and weaknesses of aircraft and recognizing that combining certain roles is inherently suboptimal, such as ISR and CAS.[69] Further, planners within the AOC need to overcome classification issues to access the relevant information.[70] However, as the military accelerates toward a significantly more complex CADC2 concept, leaders must get comfortable with fusing new technology with organizational reforms and innovative operating concepts. In other words, the next RMA could very well be the solution that enables CADC2. Merging kinetic and ISR targeting processes is a much less dramatic challenge than developing the framework to coordinate combat across all five domains of warfare. If the military is not able to overcome the

challenges of strike and ISR integration, CADC2 has little chance of succeeding. Ultimately, solving the multirole aircraft tasking problem can be viewed as one small step toward CADC2. Once these processes are in place, space, cyber, and electronic warfare could all be easily integrated into this new combined process to address targets through a litany of non-kinetic means.

Notes

(All notes appear in shortened form. For full details, see the appropriate entry in the bibliography.)

1. Slessor, *Air Power and Armies*, 200–1.
2. Moore's law refers to the idea that while the speed of computers will double every couple of years, the cost will go down. —Ed.
3. Friedman, *Thank You for Being Late*, 32–7.
4. Ochmanek, *Restoring the Power Projection Capabilities of the U.S. Armed Forces*, 2.
5. Petraeus, "We Are in the Early Stages of a Tech Cold War."
6. Mueller, *Air Power*, 3.
7. Cohen, *Air Force Strategic Planning: Past, Present, and Future*, 10–19.
8. Brose, "The New Revolution in Military Affairs," 130–1.
9. DOD, *2018 Summary of the National Defense Strategy of the US*, 9.
10. Vasquez, *Preparing the Air Operations Center*.
11. Brose, "The New Revolution in Military Affairs," 128.
12. Brose, 124.
13. TRADOC Pamphlet 525-3-1. *The U.S. Army in Multi-Domain Operations 2018*, vii.
14. Brose, "The New Revolution in Military Affairs," 130–31.
15. Hill, "An Airman's View of NTISR," 5.
16. Hill, 6.
17. Koskovich, "Targeting Pod Enhances Battlefield Awareness."
18. Hill, "Airman's View of NTISR," 6.
19. Hill, 5–6.
20. Koskovich, "Targeting Pod."
21. Vasquez, *Preparing the Air Operations Center*, 13.
22. Daniels, "US Forces Could Potentially Lose."
23. Department of Defense, "DOD Releases Fiscal Year 2021 Budget Proposal."
24. Department of Defense, "DOD Releases."
25. ASMC Land of Lincoln Chapter.
26. Brose, "The New Revolution in Military Affairs," 128.
27. James and Welsh, *Fiscal Year 2015*, 6.
28. Joint Chiefs of Staff, Joint Publication 3-30, II-3.
29. Joint Chiefs of Staff, III-16.
30. AFTTP 3-1. *AOC*, 32.

31. AFTTP 3-1, 65.
32. Joint Chiefs of Staff, Joint Publication 3-30, III-23–III-24.
33. Saltzman, interview.
34. Joint Chiefs of Staff, Joint Publication 2-0, III-10.
35. Joint Chiefs of Staff, Joint Publication 1-02, 41.
36. Joint Chiefs of Staff, Joint Publication 2-0, I-6–I-7.
37. Joint Chiefs of Staff, Joint Publication 2-01, III-19.
38. Rhodes, et al., *A Strategies-to-Tasks Framework*, 4.
39. Joint Chiefs of Staff, Joint Publication 2-01, II-18–II-21.
40. AFDP Annex 2-0 *Global Integrated Intelligence*, 5.
41. Curry, "The Current Battle," 13–17.
42. Perry, et al., *Operation Iraqi Freedom*, XXVI–XXVII.
43. Rhodes, et al., *A Strategies-to-Tasks Framework*, 5.
44. Williams, "Bullet Background Paper."
45. Saltzman, interview.
46. Joint Chiefs of Staff, Joint Publication 2-01, III-19.
47. Wintermote, interview.
48. Wintermote.
49. Wintermote; Williams, "Bullet Background Paper."
50. John A. Tirpak, "UAVs with Bite," 46–47.
51. Wintermote, interview.
52. Joint Chiefs of Staff, Joint Publication 2-01, III-19.
53. Rhodes, et al., *A Strategies-to-Tasks Framework*, 6–7.
54. Vasquez, *Preparing the Air Operations Center*, 21.
55. Peck, interview.
56. Saltzman, interview.
57. Schlessman, "AFRL MDI2 Slides."
58. Holt, interview; Schlessman, interview.
59. Schlessman, "AFRL MDI2 Slides."
60. Schlessman, "AFRL MDI2 Slides."
61. Schlessman, "AFRL MDI2 Slides."
62. Schlessman, interview.
63. Friedman, *Thank You for Being Late*, 47, 64.
64. Laslie, *The Air Force Way of War*, 56.
65. Laslie, 110.
66. Wilson, "How Does the Air Force Present."
67. Hinote, *Centralized Control, Decentralized Execution*, 42–43.
68. Schlessman, interview.
69. Saltzman, interview.
70. Wintermote, interview.

Abbreviations

AFRL	Air Force Research Laboratory
AI	Artificial Intelligence
AOC	Air Operations Center
AOD	Air Operations Directive
ATO	Air Task Order
BDA	Bomb damage assessment
CAP	Combat Air Patrol
CAS	Close Air Support
CCIR	Commander's critical information requirements
CPD	Combat Plans Division
EEI	Essential elements of information
IPOE	Intelligence Preparation of the Operational Environment
ISR	Intelligence, Surveillance, and Reconnaissance
ISRD	ISR Division
ITO	Integrated Tasking Order
JCMB	Joint Collection Management Board
JCTC	Joint Collection Targeting Cell
JET	Joint Effects Team
JFACC	Joint Force Air Component Commander
JFC	Joint Force Commander
JIPCL	Joint Integrated Prioritized Collection List
JIPEL	Joint Integrated Prioritized Effects List
JIPTL	Joint Integrated Prioritized Target List
JTAB	Joint Targeting Approval Board
JTCB	Joint Targeting Coordination Board
MAAP	Master Air Attack Plan
MAOP	Master Air Operations Plan
NDS	National Defense Strategy
NSS	National Security Strategy
NTISR	Non-Traditional Intelligence, Surveillance, and Reconnaissance

OIF	Operation Iraqi Freedom
PIR	Priority intelligence requirements
RMA	Revolution in Military Affairs
RPA	Remotely Piloted Aircraft
RSTA	Reconnaissance, Surveillance, and Target Acquisition
SEAD	Suppression of Enemy Air Defense
TACO	Targets and Collection Orientation
TET	Targeting Effects Team

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