



The Mitchell Forum

Clearing the Fog and Friction of Command and Control

by Col Frederick Coleman, USAF

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The Forum presents innovative concepts and thought-provoking insight from aerospace experts here in the United States and across the globe. In order to afford publishing opportunities for thoughtful perspectives, Mitchell Institute's Forum provides high visibility to writing efforts on issues spanning technology and operational concepts, defense policy and strategy, and unique interpretations of changing geopolitical relationships.

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A earlier version of this paper was published via Air University's Wild Blue Yonder online journal.

Introduction

There's never been a better time to be in the command and control (C2) business. The joint staff is investing heavily in the Joint All Domain Command and Control (JADC2) program, which is designed to accelerate commanders' decision cycles and close operational gaps. In turn, all the military services have programs nested under JADC2. The Department of the Air Force has the Advanced Battle Management System (ABMS); the Department of the Army has Project Convergence; and the Department of the Navy has Project Overmatch. The Air Force is also deep in the throes of overhauling its tactical C2 platforms by divesting their legacy Joint Surveillance Target Attack Radar System (JSTARS) and replacing their Airborne Warning and Control System (AWACS) with the more modern E-7 Wedgetail. At the same time, the service is advancing their Tactical Operations Center (TOC) family of systems concept.

With all this upheaval, it's tough to keep track of who's doing what to modernize command and control. There's a lot of fog and friction, and that can lead to redundant, duplicative, and sometimes unnecessary research, experimentation and testing that comes at a high dollar cost and an even higher opportunity cost. One source is the common mischaracterization of C2 and its conflation with related functions. To help dispel some of this fog and friction, C2 practitioners, customers, and developers should return to the use of precise, doctrinally grounded terminology by offering a very simple definition of C2, describing the relationship between battle management and C2, and differentiating C2 from other warfighting functions. Getting the language right will help clarify requirements, which in-turn will speed up delivery of capabilities.

Defining Command and Control _____

Joint doctrine defines command as the authority a military commander lawfully exercises over subordinates to assign missions.¹ It goes on to describe command as “the art of motivating and directing people and organizations to accomplish missions.” Control is the commander’s direction to his forces; it is a form of communication that conveys decisions and intent. Joint Publication 1 says, “to control is to manage and direct forces and functions consistent with a commander’s command authority.”² The authority to control is inherent in command, but command is not always inherent in control. Often the personnel or systems that execute control are acting on the commander’s behalf—implementing the commander’s authority, but they do not hold that authority themselves. *Simply put, command is the authority to tell someone what (or what not) to do, and control is the act of telling someone what (or what not) to do.*

Command and control exists at all levels of war. At the strategic level, the president or the secretary of defense have the authority and the ability to direct the U.S. Armed Forces to undertake a campaign or a specific mission. For example, C2 at the strategic level might look like Congress issuing a declaration of war or the authorization to use military force. At the operational level, combatant commanders and component commanders have the authority and the ability to develop and direct specific forces to achieve strategic objectives. C2 at the operational level might look like an execution order issued by a combatant command or an air tasking order (ATO) issued by an air component commander. At the tactical level, trained personnel use systems and platforms to direct and coordinate actions and activities in order to meet operational objectives.

The Relationship Between Command and Control and Battle Management _____

C2 at the tactical level is often referred to as battle management (BM). The people who conduct battle management are referred to as battle managers. C2 at the tactical level might look like a battle manager determining where to send the next set of scrambled fighters when several lanes require additional support. For clarity, it is important to note that at the terminal level (mission task execution), there are activities that take place that can be considered command and control but are not battle management. For example, a flight lead directing the tactic for an intercept or a joint terminal attack controller (JTAC) clearing a striker to employ ordnance are both forms of command and control but are not battle management.

Battle management is a subset of C2. Joint Publication 3-01 defines battle management as “the management of activities within the operational environment based on the commands, direction, and guidance given by appropriate authorities.” It goes on to describe battle management as the act of determining “where, when, and with which force to apply capabilities against specific threats.”³ Command authorities can be delegated to any level, including to battle managers. However, battle managers are not required to hold command authorities themselves in order to conduct battle management; they simply need to manage activities consistent with the authorities of the commander.

Differentiating Command and Control from Other Functions _____

C2—the authority and the ability to direct forces—is arguably the oldest function of warfighting. Our predecessors, going back to antiquity, recognized C2—by various names—as critical to victory in warfighting. Today, C2 is one of the seven joint functions defined in joint doctrine.

The other joint functions are intelligence, fires, movement and maneuver, protection, sustainment, and information.⁴ C2 is also one of five Air Force core missions. The other core Air Force missions are air and space superiority; intelligence, surveillance, and reconnaissance (ISR); rapid global mobility; and global strike.⁵

C2 is not ISR

In the Air Force, C2 is often conflated with the ISR mission, conveyed as a singular concept, “C2ISR.” Doctrinally, C2 and intelligence are unique joint functions. Similarly, C2 and ISR are unique core Air Force missions. They work in tandem with each other, but they are as different from each other as any other two functions or missions. Conflating C2 and ISR is the equivalent of conflating air superiority and ISR. The air superiority mission is extremely important and is both informed by and informs the ISR mission. In fact, success against a peer adversary is highly unlikely in the absence of ISR (i.e., if effectors like fighter assets

must rely solely on their own organic sensor, or no sensor at all). Similarly, ISR enhances understanding about the operational environment, and the decision quality of C2 practitioners is directly correlated with the accuracy of their perception of the operational environment. For battle management in particular, surveillance plays a crucial role, without which battle managers’ decision timeliness and capacity is severely limited.

Although C2 and ISR are interdependent, they are different missions that require different and unique skill sets. This is particularly true of the intelligence function of ISR, apart from surveillance and reconnaissance. At a macro level, all the Air Force’s core missions share overlaps, but lumping them together as a single concept or single acronym obfuscates critical requirements.

C2 is not battle management

Similar to C2ISR, it is common to see the joint term “battle management” conflated or adjoined to the term “C2”. Often this is expressed through the non-doctrinal but



Explanation of the layers to command and control.
 Source: Courtesy of Col Frederick Coleman, USAF.

very common term, “battle management command and control,” abbreviated to “BMC2”. Not only does the term BMC2 not exist in doctrine, but if battle management is a subset of C2, then BMC2 is redundant. Using terms like BMC2 obfuscates the type of function being described. There is a significant difference in the requirements of a tactical C2 system—a battle management system—used to pair airborne fighters to threats, and an operational C2 system used to develop an air tasking order for an entire theater. To use an analogy, battle management is to C2 what defensive counter air (DCA) is to air superiority (AS). Just as BM is a subset of C2, DCA is a subset of air superiority. Adjoining BM to C2 via the acronym BMC2 is as contextually confusing as adjoining defensive counter air to air superiority via the acronym “DCAAS” (an acronym that has never been used in the history of airpower).

When discussing systems, taskings, or requirements, “BMC2” is unclear. Instead, it is more helpful to use the doctrinal term “battle management” if discussing the tactical control mission or the term “C2” if referring to the broader C2 mission that also resides at the operational and strategic level of war.

C2 is not communication or computers _

Finally, the function of C2 is dependent on communication. Control requires the ability to communicate. Relatedly, in many

cases C2 is also dependent on computers. Because of this dependency, some have taken to changing the acronym “C2” to “C3” (command, control, and communication) or “C4” (command, control, communication, and computers). Again, these deviations from doctrinal vernacular are unhelpful. C2 is not the only joint function or core mission that is dependent on communication and computers. In fact, it could be argued that the ability to communicate and compute is a fundamental element of any modern joint function or core mission. But that doesn’t mean a “C” should be added to all military acronyms.

Conclusion

The U.S. military’s ability to command and control its forces has been a competitive advantage for decades and will be decisive in a peer or near-peer fight. As C2 experts from the DoD and the defense industry continue their efforts to modernize this joint function and core mission, it will be important to communicate using precise language. Catchy acronyms like “C2ISR,” “BMC2,” and “C3” mask critically important functions that should be treated as separate but interdependent capabilities executed by qualified practitioners. Forgoing these buzzwords in favor of more precise terminology will help clear up some of the fog and friction in the enterprise, and in so doing, hopefully help accelerate innovation. 🌟

Endnotes

- 1 Joint Publication 1, Doctrine for the Armed Forces of the United States, March 25, 2013, incorporating change 1, July 12, 2017, p. XX.
- 2 Joint Publication 1, p. I-18.

- 3 [Joint Publication 3-01](#), Countering Air and Missile Threats, April 21, 2017, p. II-27.
- 4 Joint Publication 1, p. XII.
- 5 [“Air Force Core Missions.”](#) U.S. Air Force, August 15, 2013.

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Col Frederick "Trey" Coleman is the commander of the 505th Command and Control Wing, headquartered at Hurlburt Field, Florida. The mission of the 505th CCW is to prepare and enable the Joint Force to execute war-winning command and control of Air Power. Prior to the 505th, Colonel Coleman commanded the 609th Air Operations Center in Al Udeid, Qatar. He also commanded the 961st Airborne Air Control Squadron at Kadena Air Base, Okinawa.





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The Limited Utility of Mission Type Orders for ACE... and A Better Way to Execute Mission Command

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The Thing About Airpower

Every domain has unique characteristics. For airpower, one of its most unique characteristics is its reach—the ability to launch from any location worldwide, traverse vast distances, and employ with precision at any place on the globe. Another distinctive characteristic of airpower is interdependence. Rarely does one aircraft operate alone. For example, a bomber that takes off from the United States to operate in the Arabian Gulf requires tankers, airborne early warning, electronic warfare support, and defensive counter air. A third unique characteristic of airpower is the fact that it is perpetually in low supply and high demand. The joint force has an insatiable appetite for airpower. There will never be enough of it.

These unique characteristics make airpower inherently reliant on command and control (C2). In order to make sure the right airplane is in the right place at the right time, a single airman must have command authority to decide where an aircraft will go and how it will be used (and conversely, decide where it won't be used). Once that decision is made, the employment of airpower must be planned, coordinated, and communicated. Someone must decide which routes these aircraft will use and when they will take off; they must decide what weapons they will carry and how much fuel they need; they need to coordinate diplomatic clearances with foreign countries; they must decide upon rules of engagement. The list goes on.

The Thing About the Air Component

The process of deciding where and how airpower will be utilized, then planning and coordinating its employment, is the epitome of operational-level C2. Traditionally, the functions of operational C2 are conducted by an air component, which consists of both an Air Force forces (AFFOR) staff and an air operations center, under the



An A-10 refueling from a KC-135 assigned to the 28th Expeditionary Air Refueling Squadron above eastern Afghanistan in December 2019.

Source: [U.S. Air Force photo](#) by Staff Sgt. Daniel Snider.

authority of an air component commander who typically also serves as the joint force air component commander (JFACC). The air component has the training, systems, and manpower to perform the necessary operational C2 functions. Those functions include developing the air component's strategy for airpower, determining basing requirements, coordinating inter- and intra-theater logistics, weaponeering, prioritizing targets, and planning the next day's master air attack plan (MAAP).

To effectively conduct air operations, the air component commander must have the authority to task the aircraft as well as the ability to conduct the aforementioned planning functions. These requirements typically drive air components to retain operational-level C2 functions at the component headquarters level simply because subordinate headquarters don't have the authorities, systems, or manpower to perform these operational C2 functions themselves.

An Experimental Exception: MTOs in Afghanistan

In 2019–2020, Air Forces Central Command (AFCENT) took advantage of a unique opportunity in the operational environment to experiment with delegating operational C2 functions to a subordinate echelon by issuing mission type orders (MTOs) to the Air Expeditionary Task Force–Afghanistan (AETF-A). Through a convergence of good conditions, the subordinate headquarters had both the authorities and the capabilities to perform the required operational C2 functions to effectively employ airpower.

The AETF-A commander had all the necessary aircraft assigned to him in the U.S. Forces Afghanistan theater: fighters, tankers, ISR (intelligence, surveillance, reconnaissance), electronic warfare, and mobility aircraft. He also had a planning staff in the air support operations center that was closely tied in with the joint task force (JTF) commander's staff and had the

capacity to align with the JTF's strategy, prioritize targeting, and plan the next day's operations. Moreover, his theater was remote. There were hundreds of miles of airspace between his forces and the next nearest area of operations, meaning that aircraft based in Afghanistan had limited utility to other theaters and would not likely be pulled away to perform other missions. Additionally, basing and logistics were very well established and defined. Finally, there were few, if any, complex weaponeering requirements. There were no integrated air defense systems to penetrate or take down, the airspace was largely uncontested, and there were few requirements for over-the-horizon support. It was the perfect scenario to delegate C2 authorities, roles, and responsibilities to a subordinate command. In other words, conditions were ideal for a more decentralized command and control, through the issuance of MTOs, to result in successful mission outcomes.

During the period in which the AETF-A was executing under MTOs, the AETF-A staff did all their own planning

for air operations, very similar to how an aircraft wing would develop and publish a daily flying schedule. Once planning was complete, they merely informed the AFCENT combined air operations center (CAOC) about their plan, and the CAOC would in turn put the AETF-A missions on the next day's air tasking order (ATO). What this means is that the MTOs shifted the responsibility for master air attack planning from the CAOC's combat plans division directly to AETF-A. This delegation of responsibility created some efficiencies within the AETF-A, and it was perceived to have increased responsiveness to the JTF commander's local requirements. It also eased some of the burden on the air component staff in the CAOC. However, the marginal gains were short-lived.

In 2020, the operating environment began to change. Tensions between the United States and Iran escalated, and it became necessary to pull airpower assets and staff personnel out of Afghanistan to use them elsewhere in the Central Command (CENTCOM) area of responsibility. As



Air Force F-16s fly over Afghanistan in March 2020.

Source: [U.S. Air Force photo](#) by Tech. Sgt. Matthew Lotz

AETF-A's inventory of assigned aircraft depleted, so did their ability to plan and task internally. Without the ability to organically plan and task the employment of airpower in their area of operations, MTOs were no longer efficient or effective.

The Applicability of Mission Type Orders during Agile Combat Employment _____

Doctrine does not prescribe how to use MTOs, it only suggests that MTOs can be used as applicable to enable mission command.¹ The way they were used in Afghanistan in 2019 to enable a subordinate headquarters to build their own MAAP was probably one of the most aggressive and forward-leaning ways to apply MTOs to date. However, the primary lesson learned from this MTO experiment is, when measured by the subordinate headquarters' ability to effectively plan and execute operational C2 functions that are normally performed by the air component, *the utility of MTOs is inversely correlated to the subordinate headquarters'*

requirement for external support and coordination. The more external support and coordination a theater requires, whether in terms of assets or planning, the less effective MTOs will be. This lesson has implications for the utility of MTOs during Agile Combat Employment (ACE) operations.

Air Force doctrine defines ACE as “a proactive and reactive operational scheme of maneuver executed within threat timelines to increase resiliency and survivability while generating combat power throughout the integrated deterrence continuum.”² The purpose of ACE is to complicate the enemy's targeting by disaggregating forces in theater based on the operational scheme of maneuver. ACE requires decentralized authorities and empowered commanders that have the authority and ability to act in the absence of direction from higher headquarters.

In a contested theater where commanders are exercising a dynamic scheme of maneuver to increase resiliency while generating combat power, employing MTOs



Air Force personnel assigned to U.S. Air Forces Central Command load cargo into a C-130 Hercules in the CENTCOM AOR.

Source: [U.S. Air Force photo](#) by Staff Sgt. Daniel Snider.

the way they were used in the AETF-A would probably not work. An air expeditionary wing (AEW) commander in an ACE environment will likely not have sufficient assets under his or her command to effectively package airpower, the persistent ability to communicate with external support assets, or the appropriate staff in place to replace the MAAP process or conduct other functions that are normally part of the air component's air tasking cycle.

This reality by no means invalidates the utility of MTOs entirely. MTOs can be useful in other ways. For example, MTOs can articulate the combined forces air component commander (CFACC) intent. They can help clarify command relationships during ACE, they can establish priorities, or they can codify and designate authorities in the event of degradation or denial. Yet, MTOs aren't a substitute for the air tasking cycle. Simply put, the effective use of airpower at the tactical level requires the C2 functions that are normally conducted at the operational level by the air component.

A Better Way

Moving forward, instead of trying to find ways to substitute or delegate air tasking cycle processes, perhaps our efforts are better spent on making air component systems and processes more resilient so the ATO will still be available, even in a contested or degraded environment.

The new doctrine of "distributed control" is a key component of this resiliency. The critical air component processes that today exist in a single physical location must be distributed (or at least be highly distributable) if they are to survive in a peer conflict.

Another key component of operational C2 resiliency is how we store, access, and use data systems. Transitioning from localized, proprietary, on-premises data to a cloud-based environment would allow air components to collaborate across echelons throughout the

planning process. In the event of temporary disruption, all parties would retain the most current version of the plan.

The addition of advanced software could likewise automate many of the manual functions used today during the planning process, allowing air components to compress the air tasking cycle and create space to allow for contingencies should they experience temporary disruptions in connectivity.

Finally, we should not accept the narrative that disruption and degradation are binary. As communications technology advances, the number of communications pathways increases exponentially, providing more opportunities for redundancy. The current crisis in Ukraine provides an excellent example of friendly forces working through degradation to ensure continued access to communications. At the tactical level, understanding ROEs and commander's intent is important, but it is not a substitute for operational level C2. Because of airpower's unique reliance on C2, for decades U.S. commanders have dreaded a scenario in which they have zero communications. Without any communications, a wing commander doesn't know when to launch aircraft or where to send those aircraft. Those aircraft don't operate alone—they need to meet up with a package in order to be properly employed—which means they need to know, at a minimum, when they need to be at a specific location. The point is that the likelihood of actually having zero communications in today's environment is very small. There are enough pathways to get enough information through to enable commanders to generate forces at the right time in the right place. Then those aircraft can employ with commander's intent. But commander's intent alone doesn't solve the operational C2 problem of knowing when and where to be—that still requires C2.

If we can modernize and organize the C2 enterprise in a way that ensures enough data can get through, despite degradation, then MTOs don't need to replace the air tasking cycle.

Mission Command

Although MTOs cannot and do not need to replace the functions of the air tasking cycle, they can still serve to enable mission command by delegating authorities and responsibilities for functions that are not part of the air tasking cycle. For example, MTOs can empower commanders with the authorities and trust to make decisions to defend their base, move their people and assets, and protect their logistics routes. Rather than attempting to replace the air tasking cycle, MTOs should serve to communicate the CFACC's intent to the field and empower subordinate commanders with the authorities to make the best possible decisions in line with the overarching air campaign.

As opposed to the way they were used in Afghanistan, in this same period AFCENT also issued MTOs to the Air Expeditionary Task Force–Levant (AETF-L) in Iraq and Syria. These MTOs were much more scaled-down and did not attempt to replace the air tasking cycle processes. Instead, they focused on delegating tactical level decision making authorities to “give commanders and operators the context and authority they needed for combat decision-making at echelons of command or in the cockpit.”³

The AETF-L MTOs more closely aligned with the doctrinal definition of mission command as an “approach to C2 that empowers subordinate decision-making for flexibility, initiative, and responsiveness in the accomplishment of commander's intent.”⁴ The AETF-L leveraged these delegated authorities on a number of occasions to do things like launch sorties or reposition airborne aircraft

in real-time based on tactical conditions, within the bounds of CFACC intent, but without explicit AOC direction or approval (although they provided coordination in arears).

Although the AETF-L MTOs were much less aggressive than those of the AETF-A, they also did not stand the test of time. The constant turnover and organizational realignments in that theater simply overcame the initial intent of the MTO experiment, *suggesting that mission command is best established by a culture, not by an order.*

Conclusion

Although MTOs were successful as a replacement for the air tasking cycle for a short time during the AETF-A experiment, the utility of using MTOs in this manner will be limited during ACE. The unique characteristics of airpower require a degree of planning and coordination that MTOs cannot replace unless a commander has all the necessary assets, connectivity, and expertise under their command to effectively plan and execute airpower without external support. The good news is that the U.S. ability to plan and communicate in a contested and degraded environment is rapidly improving. Through distribution and modernization, we can ensure that the ATO (or a similar organizing mechanism) will get through.

Airpower's natural reliance on C2 does not detract from an AEW commander's authority or his or her ability to execute mission command. Mission command isn't about orders, it's about trust. It's about ensuring airmen understand that the purpose of their mission is more important than their explicit task. The best use of MTOs is likely as a mechanism to convey commander's intent as part of a culture of mission command. ✪

Endnotes

- 1 [Air Force Doctrine Publication 1, *The Air Force*](#), March 10 2021, p. 12.
- 2 [Air Force Doctrine Note 1-21, *Agile Combat Employment*](#), August 23, 2022, p. 2.
- 3 Alex Grynkewich and Antonio Goldstrom, “[The AETF Today: Enabling Mission Command of Airpower](#),” *Air and Space Power Journal*, Summer 2020.
- 4 [Air Force Doctrine Publication 1, *The Air Force*](#).

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Distributed Control: Getting It Right

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Applying Centralized Command, Distributed Control, and Decentralized Execution to Modern Air Operations

In 2021, the Air Force quietly but radically updated its most fundamental principle of airpower. For over 45 years, the Air Force built its doctrine around the master tenet of “centralized control, decentralized execution.” While the revision added only two words, the update will fundamentally change the way the Air Force fights. “Centralized command, distributed control, and decentralized execution” lays the groundwork for the Air Force of the future.¹

The transition actually changes two essential elements of Air Force doctrine. First, it separates the authorities of command from the function of control. This differentiation between command and control (C2) is a critically important nuance that has been missing in previous doctrine and is foundational to mission command. Second, the new tenet emphasizes the imperative of distribution. In an era where new and emerging technology might make centralization very appealing because of the potential efficiency gains, distributing control might seem counterintuitive. However, while centralization may be efficient, it introduces untenable risks to military effectiveness in modern informationized battlespaces against peer adversaries.

Distributed control, executed under the authority of centralized command, creates harmony in the tenuous balance between centralization and decentralization. This paper explores ways in which control can be effectively distributed, particularly at the operational level of war, recognizing there will be some predictable and inevitable pitfalls and risks along the pathway toward distribution. Ultimately, if approached conscientiously, the newly revised doctrine of centralized command, distributed control, and decentralized execution has the potential to drive a new paradigm for the application of air power: one that will be essential for victory against a peer adversary.

Command versus Control _____

In 2009, then Lieutenant Colonel (now Lieutenant General) Clint Hinote wrote what is probably the most in-depth analysis of “centralized control, decentralized execution.” In his seminal work, Gen Hinote traces the lineage of the phrase back to Air Force doctrine of 1975. However, he also highlights that the tension between centralization and decentralization didn’t just appear in 1975. In fact, this tension is centuries old, and it is not limited to the air domain. To make his point, he offers examples of the tension between centralization and decentralization that include 17th century naval operations and 19th century Civil War battles.² Ultimately, Gen Hinote concedes that, while decentralized operations are preferred, there will also always be a need for centralized decision-making. Someone needs to be in charge: “There is always a trade-off between the centralization and decentralization of air operations.”³

The Air Force’s newly articulated tenet helps to ease the tension between centralization and decentralization by distinguishing command from control. The purpose of centralization is to ensure that basic warfighting principles like mass and economy of force are leveraged during operations—to ensure limited resources are aligned and synchronized around a common strategy. This strategy should be driven by a single commander with the decision-making authorities to direct forces and resources. Command, after all, is authority.

The commander with the authority to direct forces and resources needs to communicate his or her decisions to the field. That communication comes in the form of control. Control is the act of telling the fighting forces what to do. At the operational level of war, control may include developing a basing scheme or codifying rules of engagement. Control also happens at the tactical level of war: for example,

directing bombers to strike a target or directing fighters to defend an area.

The authority to control is inherent in command, but command is not inherent in control. In fact, control does not need to be conducted by the commander at all. Instead, the commander can articulate his or her intent through the staff and tactical control agencies, whose job it is to ensure the commander’s intent is executed during operations. In turn, the fighting forces, the control agencies, and the staff provide feedback to the commander, who then updates his or her guidance.

The previous tenet, “centralized control, decentralized execution,” did not distinguish between command and control. Instead, it implied that all control should be centralized with the commander and that only tactical execution should be decentralized. This seemingly binary ultimatum created a glaring weakness in any contested or degraded environment. What happens if decentralized execution is disconnected from centralized control?

Separating the control function from command and distributing that function across the operational environment can mitigate the risks presented by contested communications while simultaneously maintaining the linkage between centralization and decentralization. Simply put, distributed control is the bridge that links centralized command to decentralized execution.

Distribution _____

The Air Force’s legacy control enterprise is not designed for distribution, it is designed to be centralized. As such, U.S. systems are bulky, expensive, and vulnerable. They are also highly stovepiped. They don’t share information well. Their data is often proprietary, stored locally, and almost always poorly categorized. Our adversaries are keenly aware of vulnerabilities and

most certainly plan to attack them during future conflict. The good news is that there is broad agreement that today's systems are not sufficient and there is significant energy behind efforts to modernize them.

The Air Force's shift towards distributable systems is made possible by the availability of new and emerging technology. Technology like cloud-based data, automation, and low-earth orbit satellite networks can and should propel the Air Force out of legacy control systems and into a more resilient distributable enterprise. Distribution is a critical element in ensuring "resiliency against attacks on our C2 facilities, systems and processes, for continued combat effectiveness in contested environments."⁴

The first step in enabling distribution is building the network and software that can support it. Across the Department, the Advanced Battle Management System (ABMS) team is already in the process of doing just that. Throughout the Air Force and the broader Department of Defense, commanders, their staffs, control agencies, and tactical operators must be able to share information within and between theaters. Even if ABMS does nothing more than digitally connect the force, it will still be a tremendous success. With the right network and software tools, the legacy C2 enterprise can transition from highly centralized to highly distributable.

Joint doctrine defines the operational level of war as "the level of war at which campaigns and major operations are planned, conducted, and sustained to achieve strategic objectives within theaters or other operational areas."⁵ At the operational level, the Air Force executes command and control through the air component, which includes the Air Force forces (AFFOR) staff (or A-staff) and the air operations center (AOC). Although every air component is

organized differently, in general, the A-staff focuses on operational-level functions outside the air tasking cycle such as contingency planning, force bed-down, and logistics; the AOC focuses on operational-level functions directly related to the air tasking cycle, such as planning the next day's air operations, overseeing the execution of air operations, and the assessment of air operations.⁶ The AFFOR and the AOC provide control services on behalf of the air component commander, who in turn reports to the combatant commander.

The control services provided by the air component are essential to air operations. Without these operational-level control functions, there would be no tactical-level execution. For example, someone needs to determine where aircraft and personnel will be based, how resources will be prioritized, and what objectives forces will pursue. This is operational-level business conducted by the air component.

Air components can be distributed both geographically and functionally. Geographically speaking, instead of locating the entire air component staff at the same vulnerable location, some staff can distribute their geographic locations forward in theater or rear in the United States. Distributing the air component geographically ensures that denial, degradation, or destruction at one location does not create a complete stoppage of operational C2 functions.

However, geographic distribution by itself does not achieve resiliency. To be truly resilient, air component functions must also be distributed, so that if one location is degraded or denied, the functions performed by that location can be performed at another location.

Ultimately, determining how best to distribute the air component is the air component commander's decision. Every

operational environment is different. Therefore, the way the air component distributes its operational C2 functions and locations should be based on the unique needs of that theater and should be aligned with the air component's higher headquarters: their combatant command.

The air components know they are vulnerable. They know they need to distribute (or be rapidly distributable) in order to survive and fight effectively against a peer or a near-peer. They are already taking steps to enable distribution. However, to do this right, the air components require a cloud-based, secure, and resilient digital architecture, along with cloud-based software. This is an enterprise-wide problem that must be solved at an enterprise level. Modern digital infrastructure and the software that resides on it is the lynchpin to distributing operational-level command and control.

Joint doctrine defines the tactical level of war as “the level of war at which battles and engagements are planned and executed to achieve military objectives assigned to tactical units.”⁷ Often times, control at the tactical level comes in the form of battle management. Battle management is a subset of tactical control. JP 3-01 defines battle management as “the management of activities within the operational environment.”⁸ Distributing control at the tactical level means distributing the ability to conduct battle management throughout the theater. This is particularly necessary in a contested or degraded environment.

The Air Force has traditionally executed battle management through legacy control platforms like the Airborne Warning and Control System (AWACS) and the Control and Reporting Center (CRC). However, these second-generation platforms are in high demand, short supply, and have extremely poor readiness

rates. Moreover, from a technological perspective, they are grossly out of date, to the point of being nearly irrelevant in a 5th generation fight.

Not only are today's battle management systems antiquated, but they are designed to provide battle management services across massive areas of responsibilities spanning hundreds of miles. These centralized legacy systems will not be capable of covering vast swaths of airspace in a contested or degraded environment. In fact, they may not even survive in a contested or degraded environment.

Just as operational control systems must be distributed (or distributable) to remain relevant in a contested or degraded environment, so must tactical control systems. The Air Force has a number of systems in design today, many already on an acquisitions pathway, to enable improved distribution. However, after spending decades operating under the doctrine of centralized control, airmen will need to reframe their tactics, techniques, and procedures to be more prepared to conduct decentralized tactical-level execution if they are disconnected from their control agency. This will require new ways of training and new training objectives, so that decentralized execution is fully ingrained into tactical operations.

Pitfalls and Siren Songs

Although the Air Force is moving in the right direction towards distribution, there will still be difficulties to realizing a fully distributed force, as well as many attractive ideas that are ultimately unhelpful at best or destructive at worst. These pitfalls and siren songs could lure us away from progress toward the future of distributed control. Below are three of the leading contenders.

Distribution isn't a back-up plan

Military organizations have had continuity of operations (COOP) plans for ages. They've often gone by other names, but the idea is always the same. Traditionally, a COOP plan is a back-up plan. It's what an organization will do when the primary plan doesn't work.

While it may be tempting to frame distribution as a COOP measure, distribution is not a back-up plan. Instead, distribution must be a primary, permanent, daily way of operating to ensure continuity of operations without having to fall back on an alternate or contingency plan. The new doctrinal mandate to distribute control acknowledges that the U.S. Air Force operates in a degraded environment every day, and control organizations don't have time to move people and change facilities or platforms every time they experience degradation.

Automate, don't consolidate

Distribution is not efficient. Distribution is, in fact, inefficient. Distribution means using more people in more facilities, or, at the very least, it means using more systems to proliferate data flow throughout the theater. At a very simplistic level, distribution means "more," and it is therefore inherently inefficient, and can also be more expensive. However, it must be noted that the operational goal is not efficiency, but effectiveness. Redundant systems and distributed control are more resilient and deny the enemy a "single point of failure" target.

Unfortunately, while Air Force doctrine has changed in favor of distribution, there is no accompanying windfall of resources. In fact, the Air Force currently faces many much-needed modernization and recapitalization expenses that create very real budget constraints. This juxtaposition is driving increased calls for the global consolidation

of operational C2 functions, despite the doctrinal shift towards distribution. Consolidation, sometimes disguised as "federation" or "centralization," is the antithesis of distribution, although it is very appealing as an easy answer for efficiency and theoretical cost savings.

In the case of operational C2, consolidating, federating, or centralizing air component staff functions under a single command may be marginally more efficient, but that efficiency comes at the cost of mission effectiveness. Imagine an air component commander's staff that has been consolidated with other air component staffs and therefore does not work for the air component commander any longer: a staff whose time is prioritized, allocated, or apportioned by a different commander and is in competition with other air components. Even worse, imagine if there was only a single location in the world where a specific operational C2 function was performed on behalf of all the air components, and that single location was denied or degraded. In a contested/degraded global environment, consolidation is not the answer.

It will be extremely challenging to evolve the Air Force's operational C2 enterprise in a way that is both distributed and economical, but it is not impossible. To achieve economy while maintaining operational effectiveness, we should focus on automation rather than consolidating air component staff functions.

Today's operational C2 processes are extremely manpower intensive. Our legacy operational C2 processes can be made much more efficient through more modern cloud-based software solutions that incorporate artificial intelligence (AI) and machine learning (ML). Advanced networks and software can aid or replace our existing manpower intensive processes while enabling distribution and keeping

staff functions under the command of the air component commander. Automation, not consolidation, is the enduring solution for efficiency in the operational C2 enterprise.

Distribution isn't the old way of doing business

As the Air Force seeks to distribute control at the tactical level, there is a tendency to prefer, develop, and invest in new ways of doing business the old way. For example, it is very natural to turn to new, better airborne platforms or new, better ground systems that simply replace legacy systems.

Although it is absolutely necessary to modernize its legacy tactical control systems, the Air Force simply cannot afford to purchase enough of these systems to sufficiently proliferate them globally. Nor can it afford to substantially grow the number of battle managers on the payroll. Therefore, we must find new, more efficient, more automated, and more agile ways of conducting battle management. Future battle management systems should require less human presence and less human input.

One option for distributing tactical C2 is to focus on proliferating unmanned sensors and relays that can extend the reach of the force to the tactical edge while keeping the human battle managers located at key nodes. At the same time, emerging battle management software must be enabled by AI and ML to decrease the manual, human interfacing that is required by today's battle management processes. Although there will always be a need for human decision-making in battle management, battle managers could more efficiently conduct their tactical control responsibilities with fewer errors if they were assisted by advanced software that automates labor-intensive, data-driven processes.

Conclusion

The newly updated master tenet of “centralized command, distributed control, and decentralized execution” has the potential to radically change the way the Air Force employs air power. By differentiating command from control and emphasizing distribution, the Air Force has set the stage for the next generation of employment that won't just survive but thrive in a contested or degraded environment.

Overhauling the Air Force's digital infrastructure is an essential first step in distributing control. By developing cloud-based applications that incorporate AI and ML and ensuring a robust digital architecture that includes multiple pathways for connectivity, the Air Force can enable air component commanders to distribute their staffs in ways that are optimally suited for their operational environment and that best meet their combatant commanders' requirements. At the tactical level, modernized digital infrastructure, including cloud-based data, automated software, and redundant pathways, will allow the promulgation and automation of battle management functions that otherwise may not be able to reach the tactical edge.

On the journey toward distributed control, it will be important that we avoid treating distribution like a back-up plan. We should resist the siren song of consolidation. Centralization is our legacy. Distribution is our future. We cannot accept new ways of doing old things. We must be visionary, we must be disciplined, we must truly change, or we will lose. ✪

Endnotes

- 1 [Air Force Doctrine Publication 1, *The Air Force*](#), March 10 2021, p. 13.
- 2 Clint Hinote, [Centralized Control and Decentralized Execution. A Catchphrase in Crisis?](#) (Maxwell AFB, AL: Air University, Air Force Research Institute, March 2009), pp. 3–5.
- 3 Hinote, [Centralized Control and Decentralized Execution](#), p. 58.
- 4 Sandeep Mulgund, [“Evolving the Command and Control of Airpower.”](#) *Wild Blue Yonder*, April 21, 2021.
- 5 Joint Publication 1-02, Department of Defense Dictionary of Military and Associated Terms, 2022, p. 150.
- 6 [Air Force Instruction 13-103, Air Component Headquarters AFFOR Staff Operations, Readiness and Structures](#), November 19, 2020.
- 7 Joint Publication 1-02.
- 8 [Joint Publication 3-01, Countering Air and Missile Threats](#), April 21, 2017, p.II-27.

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