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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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