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The Combined Air & Space Operations Center (CAOC) at Al Udeid Air Base, Qatar.

Evolving C2 for Decisive Air Power

By Brigadier General Mehmet Serkan Dan,
TÜR Air Force, Deputy Chief of Staff Plans, AIRCOM

Introduction

NATO's ability to achieve decisive air effects hinges on command and control (C2) agility, yet contemporary threats increasingly challenge traditional C2 paradigms. While air superiority remains the cornerstone of success in modern conflict, sophisticated adversaries and high-tempo operations demand more than established principles; they necessitate a C2 evolution capable of maximizing effects, mitigating vulnerabilities, and driving the operational tempo against peer competitors.[1]

In this context, the traditional air power principles of centralized command and decentralized execution may no longer suffice for victory, given the threat environments of today and the future. The emergence of long-range ballistic missiles supported by advanced intelligence, surveillance, and reconnaissance (ISR) systems, stand-off munitions from low-observable aircraft, and offensive one-way unmanned aerial vehicles (UAVs) with precision strike capabilities underscores the need for new C2 approaches to sustain air operations against near-peer adversaries.[2] Consequently, this article argues that enhancing air power C2 survivability

NATO's E-3 AWACS leads a formation of fifth-generation F-35s, symbolizing the integration of surveillance, command, and strike capabilities. This synergy reflects the evolving C2 structure - centralized command coordinating with agile, forward-deployed forces through resilient, distributed control mechanisms.

and effectiveness requires adopting a distributed approach, strategically delegating execution authorities while retaining central strategic oversight.

The Enduring Imperative: Unity of Command

It remains essential that a sole air commander retains responsibility for commanding air forces and generating effects within the operational theatre. Without command integrity, air forces cannot be expected to gain and maintain air superiority. Fragmenting air forces without unity of command prevents the creation of desired effects, ineffectively dissipates resources, and ultimately hinders mission accomplishment. However, an approach based on appropriately distributing C2 authorities, while maintaining fidelity to central command, enables sustained operations in high-threat environments.[3]

An air force requires innovative design and active command, much like the human body relies on a functioning brain. However, the inherent vulnerability of C2 centres – due to imperfect air defences and their status as likely primary targets – necessitates the functional and geographical distribution of planning, coordination, and assessment processes, even while centralized command and approval authority remain vital for force management. Furthermore, when elements operate with initiative in dynamic environments, guided by the commander's intent, they effectively translate plans into action on the ground. In short, centralized command, distributed control, and decentralized execution form the cornerstones of the modern air C2 approach.[4]

Agility for Resilience

The Ukrainian Armed Forces' ability to sustain prolonged resistance against Russian forces, stems in part from an operational dynamism that seeks to complicate and disrupt the enemy targeting cycle. Specifically, the Agile Combat Employment (ACE) approach – whereby fighter jets and surface-based air and missile systems remain mobile rather than fixed – has been a notable contributing factor to their survivability, alongside other critical operational adaptations such as carefully managing their exposure within contested airspace. Successfully continuing operations from dispersed airfields has enabled Ukrainian air forces to remain viable and defend their nation.

While individual dispersed elements under ACE may face increased risks of intermittent connectivity, integrating the ACE concept into a distributed C2 framework is intended to enhance the resilience of overall command effectiveness. This approach mitigates the risk of a catastrophic single-point failure in the C2 system, even if some components temporarily operate with degraded communication. One example of ACE methodology is

Distributed control empowers subordinate nodes with delegated authorities, supporting the commander's intent and sustaining operations.

the use of concealment and deception. Supporting movement cycles with active and passive deception methods is a key aspect of warfare and has been instrumental to numerous historical victories. Achieving a high level of agility and resilience, however, relies not only on physical dispersal and movement, but also on an underlying C2 structure that empowers timely decision-making closer to the point of execution. Realizing such empowerment, in turn, necessitates distributing control functions, built upon a foundation of mutual trust and shared understanding of strategic objectives.

Furthermore, it must be acknowledged that for complex Composite Air Operations (COMAOs), 'shared understanding' alone is insufficient for precise synchronization. The successful aggregation and coordination of diverse force elements from dispersed locations under ACE fundamentally relies on robust, resilient, and sufficiently redundant communication and information systems (CIS) capabilities, as outlined later, to facilitate essential data exchange and command direction, even if such communication is intermittent or constrained. The Ukrainian experience, often involving smaller, more agile packages, offers lessons in survivability, but scaling to large NATO COMAOs under distributed C2 will require thoroughly developed tactics, techniques, and procedures (TTPs) and technological enablers for coordination beyond just strategic alignment.

Executing Commander's Intent Through Distributed Control

Functionally, distributed control involves delegating specific authorities to relevant components according to protocols and orders to execute the commander's intent, retain initiative, and maintain operational synchronization. This distributed structure, typically involving delegation at the operational and tactical levels, allows subordinate units to perform specific Combined Forces Air Component Command (CFACC) functions proactively, based on the commander's course of action, or reactively in situations like communication loss. Operational intensity, unique geography, and time constraints may define the scope of delegated responsibility.

The operational level of warfare involves planning and executing major operations using military art to achieve strategic objectives. The CFACC and subordinate Air

Operations Centres (AOCs) are the primary elements managing, coordinating, and synchronizing air power activities. Achieving the desired transformation involves distinguishing between C2 functions: while strategic tasks such as deployment plans, contingency plans, sustainment activities, and long-term planning remain centralized, tasks such as the production of Air Tasking Orders (ATOs), focused on the near-term, should be delegated to subordinate echelons, accommodating varying command preferences as needed.[5]

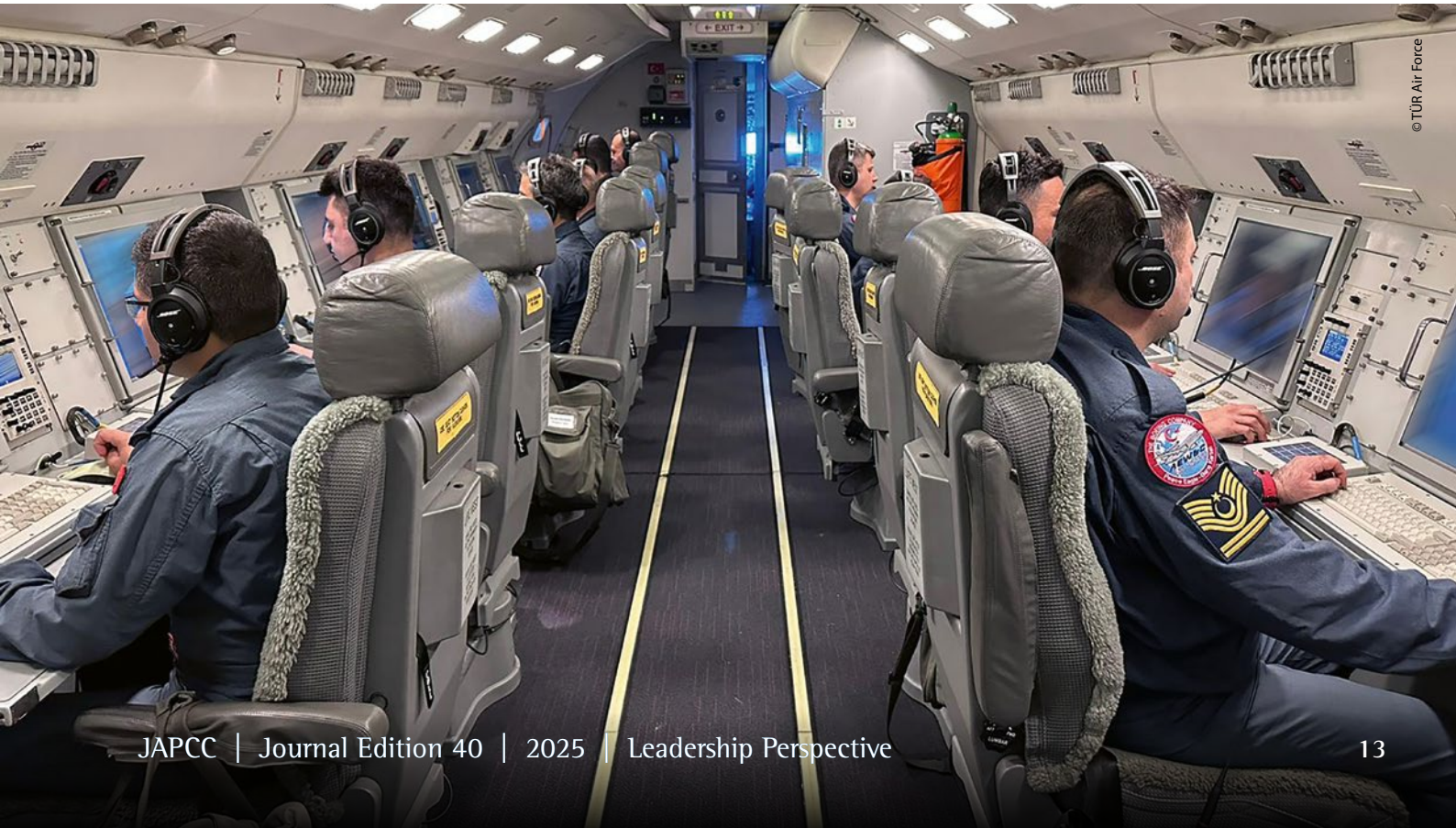
Moreover, since complete protection from air defence systems is unrealistic due to the ongoing technological race, distributing these elements geographically and functionally provides optimal sustainability. Dispersing operations centre personnel to suitable locations in depth and along different axes, rather than concentrating them in a single centre, mitigates the vulnerability of potential enemy attacks restricting or eliminating C2 functions. In this distribution model, dispersed personnel and functions serve as functional backups to the CFACC; if primary capabilities are attacked, these redundancies ensure C2 cycle continuity.[6]

For example, during extensive operations against a near-peer adversary, centralized command can be maintained while delegating authorities to subordinate command centres based on their geographical expertise, experience, and capabilities. A robust CIS infrastructure that can support the transfer of functional responsibilities enhances flexibility. Critically, the operations centres receiving delegated control must possess the necessary technical capability, operational experience, and personnel quality and quantity to effectively manage the cycle.

'The key criterion is whether distributing the function enhances tempo, resilience, and lethality without compromising overall operational coherence or risking fratricide.'

At the tactical execution level, distributed control is currently delegated to an Air Battle Manager (ABM) located in a ground or airborne C2 node, or it may involve a fighter pilot serving as the Mission Commander or package leader. However, the concept of distributed control discussed in this article moves beyond traditional decentralized execution by formally delegating specific C2

Airborne C2 nodes support dynamic decision-making and ensure operational synchronization.



Forging air superiority through distributed command: A formation of NATO F-16 fighters exemplifies the agility and cohesion required for modern air operations.

authorities and responsibilities, typically resident within a primary AOC, to designated subordinate echelons or geographically dispersed nodes. This could mean one subordinate C2 node is empowered with dynamic targeting approval for a specific region based on pre-agreed authorities, while another assumes lead responsibility for integrated air and missile defence (IAMD) in its sector if the primary AOC is compromised. To achieve distributed control, nodes must operate with a common operational picture, shared C2 processes, and clear hand-over/take-over protocols for these delegated functions, ensuring that control itself, not merely the execution of tasks, is resilient and adaptable.

Awaiting Challenges: Towards a Distributed Future

Transitioning to a truly effective model of centralized command, distributed control, and decentralized execution presents significant, though surmountable, challenges that require deliberate attention. While the principle is sound, its practical application demands careful consideration of which functions are best suited for delegation away from the central CFACC.

Functions potentially suitable for delegation could include aspects of near-term operational planning (like ATO production), dynamic targeting authority, certain airspace control functions in specific sectors, localized IAMD engagement decisions, and potentially, elements of tactical-level ISR tasking and fusion. The key criterion is whether distributing the function enhances tempo, resilience, and lethality without compromising overall operational coherence or risking fratricide.

However, such distribution inherently introduces follow-on challenges. Maintaining synchronization and deconfliction across geographically or functionally dispersed control nodes becomes more complex. Ensuring every echelon understands and adheres to the overarching commander's intent, is therefore paramount, and leadership initiative must be encouraged under degraded communication conditions. There is an inherent risk that decentralized execution, if not bounded adequately by clear rules of engagement and intent, could diverge from the central plan, leading to suboptimal outcomes or unintended consequences. Furthermore, verifying the capabilities and readiness of subordinate echelons to assume these delegated responsibilities requires rigorous assessment.

Overcoming these hurdles necessitates a concerted effort. It demands the careful development of a robust doctrine that clearly outlines authorities, responsibilities, and limitations within a distributed C2 framework, with an emphasis on pre-negotiated authorities

and robust data synchronization strategies. New TTPs must be meticulously crafted and validated. Perhaps most importantly, these concepts cannot merely exist on paper; they require extensive rehearsal through demanding exercises and wargames. These events must realistically simulate the high-tempo, contested, and communication-degraded environments where distributed control is most needed, allowing forces to identify friction points, refine procedures, build trust, and validate the model's effectiveness before it is relied upon in actual conflict.

Pathway to Implementation

Given the established need for conceptual transformation in air power management, the essential question is, 'What should we do?' Effecting these changes requires a rapid, practical integration process, and the DOTMLPFI (Doctrine-Organization-Training-Materiel-Leadership-Personnel-Facilities-Interoperability) framework provides a structure to identify the necessary actions, which are grouped logically below:

Doctrine:

- Define, document, train, test, and refine TTPs with a 'train as you fight' mentality.
- Establish necessary information-sharing procedures and permissions between elements in peacetime.
- Ensure doctrine supports the ability to execute and synchronize Multi-Domain Operations (MDO), incorporating cyber and space effects within the distributed structure.

Organization:

- Structure forces and command relationships to support distributed control, ensuring designated subordinate centres are appropriately resourced and empowered.
- Delegate responsibilities in accordance with regional and functional expertise.
- Maintain the organizational capacity for MDO synchronization even within a distributed C2 model.

Training:

- Implement rigorous training programmes focused on developing skills needed for decentralized execution, including initiative, understanding the commander's intent, and operating under degraded conditions.
- Utilize demanding exercises and wargames to test and refine distributed C2 concepts and build trust.

Materiel:

- Ensure robust, resilient, and sufficiently redundant CIS capabilities; explore and leverage cloud-based systems and low-orbit satellite communications.
- Pursue automation and, where feasible, artificial intelligence applications to enhance C2 functions and alleviate personnel demands.
- Enhance IAMD capabilities across all layers to protect C2 nodes and forces.

Leadership:

- Cultivate leadership that fosters mutual trust and encourages appropriate initiative within the commander's intent.
- Ensure leaders at all levels are trained to communicate and understand the overarching mission goals and intent.

Personnel:

- Develop well-trained, adaptable, critically-thinking, and 'warrior-spirited' air personnel capable of making sound decisions under pressure and with delegated authority.
- Identify manpower requirements for distributed operations and ensure personnel possess high situational awareness.

Facilities:

- Prepare and potentially harden designated primary and alternate/dispersed C2 facilities, considering geographic distribution and specific roles (e.g. subordinate AOCs).
- Select facility locations considering physical infrastructure, access to expertise, and regional knowledge.

Interoperability:

- Develop and regularly exercise standardized NATO procedures for distributed C2 scenarios.
- Invest in C2 architectures designed for interoperability within NATO and with designated mission partners. Utilize open standards and flexible interfaces.

- Establish and enforce common NATO data standards, communication protocols, and interoperable C2 system interfaces.

Implementing this transformation requires a fundamental shift in mindset alongside these tangible actions. This list is, of course, not exhaustive, and leaders must proactively examine their own organizations for distribution and delegation opportunities.

Conclusion

Change is constant, yet transforming established ideas and practices often meets resistance. Air power, a decisive factor since World War II, owes its success to intellectual leadership and adaptability. NATO airspace, territory, and territorial waters, defended through active deterrence for over 75 years, require continued protection achieved by accurately analysing operational risks and developing counterstrategies. As underscored in the title, achieving decisive power in future conflicts hinges on evolving our C2 structures to match the speed, complexity, and lethality of the modern battlespace. The proposed model of centralized command, distributed control, and decentralized execution directly contributes to this decisiveness by enhancing resilience against attacks on C2 nodes, increasing operational tempo through empowered subordinate echelons, and fostering the initiative needed to outpace adversary decision cycles.

Demonstrating our superiority in how we wage war, particularly through evolved C2, is a credible way to ensure deterrence and collective defence – NATO's core tasks. A well-functioning distributed control process is an effective deterrent when perceived by adversaries and guarantees functional C2 in high-intensity air operations. However, this evolution must be proactively accomplished. Implementing and exercising the concepts discussed in this article during peacetime is, therefore, critical and should proceed without delay. ●

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ABOUT THE AUTHOR

Brigadier General Mehmet Serkan DAN

TÜR Air Force, AIRCOM

Brigadier General Mehmet Serkan DAN graduated from TÜR Air Force Academy in 1996. As a fighter pilot and weapons and tactics instructor, he served at numerous positions and various operational missions with more than 4,000 flight hours in F-4, E-7, and F-16s. After graduating from Air Force Institute at 2021 and commanding TÜR AWACS Group, promoted to Brigadier General and assigned as Commander of 10th Main Jet Base-Incirlik. He has been assigned to NATO Allied Air Command, Ramstein, Germany, as DCOS Plans since 4 September 2023.