

iC2

Advancing our Understanding of Command and Control

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Executive Summary

Complex, multi-domain operations against non-state actors, near-peer competitors, and in regions without a strong coalition presence require a new perspective on how the Air Force understands Command and Control (C2). The growing volume of data and available assets, coupled with an increasingly complex operating environment, demands this change.

Commanders can no longer rely solely on the capabilities they have within their formal control and, instead, must look to leverage the full spectrum of available sensors and effects.

Importantly, if they remain focused only on their sphere of control and do not recognize the value of informal influence relationships across all domains, it is unlikely that they will work to achieve the desired end-state their mission dictates. In order to develop a concept of operations (CONOP) capable of providing a global, networked C2 infrastructure that links sensors-to-effects, the Air Force must refine its doctrinal understanding of C2. In doing so, influence must become a key aspect of the new definition, expanding Command and Control into Influenced Command and Control, or iC2.

“War will remain a clash of wills between thinking adversaries, and it will occur in an environment of uncertainty and rapid change. However, the character of warfare is becoming far less predictable and more complex.”¹ The perspective from the Air Force Future Operating Concept (AFFOC) recognizes that conflicts and contingencies are becoming increasingly dynamic and difficult to navigate. The world is no longer composed of clearly defined domains or adversaries. Further, technology continues to grow at an accelerated rate, leading to new and unpredictable capabilities. This uncertainty, coupled with a progressively more connected yet complicated world, demands a considerable change in perspective.

Unlike the Cold War era, the current geopolitical landscape encompasses more than two superpowers engaged in proxy wars and strategic maneuvering. In addition to near-peer competitors, the United States must also contend with non-state actors and various contingencies that can rapidly emerge anywhere in the world. To deal with this complex environment, the Air Force, and the U.S. Government as a whole, must be able to operate across all domains (Air, Land, Sea, Space, and Cyberspace), quickly responding within whichever domain, or domains, the situation dictates. This is the foundation of multi-domain operations.

Importantly, the current operating environment requires more than simply combining capabilities from different domains to produce an effect. It demands cross-domain synergy, which can be defined as “employing capabilities so that they reinforce each other without undue redundancy or overlap.”² Ultimately, the goal is that if certain capabilities are effectively leveraged together, the outcome is greater than if employed simultaneously but separately.

Cross-domain synergy is one aspect of a broader strategy to prepare the Air Force for future operations against a myriad of threats. Equally important is the ability to work with other organizations outside of the Air Force to accomplish the mission. The Air Force Future

Operating Concept reinforces the need for cross-domain synergy by acknowledging that “the future Air Force will conduct its five core missions as part of a joint, interagency, or multinational force.”³ As with cross-domain synergy, correctly integrating the capabilities of other organizations will lead to synergistic effects far greater than the sum of the parts.

All of these concepts support the idea that, in current and future operations, the Air Force must have the operational agility to adapt quickly to highly dynamic operating environments. Agility is especially critical when it comes to Command and Control (C2). One of the Air Force’s core missions, Global Command and Control is the cornerstone of military action. The issue is that current C2 doctrine focuses primarily on a commander’s sphere of control over assigned forces and capabilities. This stovepiped mentality hinders a commander’s ability to leverage the full spectrum of U.S. capabilities in an increasingly complex environment. In order to break out of this limited perspective, the Air Force must promote a shift in the current C2 paradigm to one that views problem sets holistically and recognizes the value of informal influence relationships across all domains.

As the Air Force works to develop a solution to Global Command and Control in order to “synchronize forces across domains, with or without direct contact with those forces,”⁴ a number of key ideas emerge that are necessary to drive an appropriate mindset shift. First, a transformational approach must be utilized to redefine Command and Control. The current C2 construct is not equipped to handle current or future complex operating environments. While new, more advanced technology and capabilities will certainly help, the answer to this problem must be comprehensive and include both materiel and personnel solutions. Second, in order to develop a truly effective C2 infrastructure, the Air Force must begin by expanding the doctrinal definition of Command and Control.

There is a reason why, when analyzing solutions to capability gaps, the DOTMLPF-P framework begins with doctrine. In addition to being a critical, non-materiel solution, doctrine reflects our current perception on what we believe is the most effective strategy for accomplishing our objectives. Everything we have learned about what works best should be codified into doctrine, shaping how we conduct future action. The current issue is that the doctrinal definition of Command and Control is outdated. Joint Publication 1-02 defines C2 as “the exercise of authority and direction by a designated commander over assigned forces in the accomplishment of the mission.”⁵ This definition reinforces the traditional mindset that views domains as separate and capabilities in terms of what you have direct control over, neglecting the value of synergistic effects and leveraging pre-existing informal influence relationships to gain access to external capabilities.

In a constantly evolving environment, the Air Force must maintain operational agility across multiple domains. Furthermore, as highlighted in the AFFOC, “dynamic command and control should exist across all components of a joint or combined task force, enabling any component to assume a supported or supporting role depending on the circumstances.”⁶ These ideas require a doctrinal definition of C2 that recognizes the importance of both influence outside of assigned forces and the complexity of the continuously evolving operating environment.

Further, this refined definition must also be viewed through the lens of three key assumptions.

The first assumption is that the Air Force is the first to respond to a contingency event. Airpower is often the instrument of choice for politicians due to its speed, global reach, and relatively low cost in relation to achieving strategic effects. Second, as illustrated above, multi-domain operations demand cross-domain synergy. The benefits of complementary effects significantly outweigh the cost of finding ways to move beyond information and capability silos

through lateral leadership. Finally, while there are steps that can be taken within the Air Force to effect a change in our understanding of C2, the ultimate solution to achieve a Global Network C2 infrastructure is at the national level. It is therefore essential to have a strategy that is scalable from the tactical, squadron level to the joint, interagency, and even coalition level. Just as information and capabilities can no longer be stovepiped, neither can the solution to effective Command and Control. As Pete Blaber proclaims in *The Mission, the Men, and Me*, “it’s not reality unless it is shared.”⁷

Based on these assumptions and viewing the C2 problem through the DOTMLPF-P framework, the critical first step in realizing a solution to scalable, global, and networked Command and Control is expanding the doctrinal definition of C2. With an eye toward acknowledging the importance of informal relationships and the consequential ability to influence those outside of a commander’s assigned forces, Command and Control should be transformed into Influenced Command and Control (iC2). Influence in iC2 is the central theme to this expanded idea, which defines C2 as: the exercise of authority, direction, and *influence* by a designated commander over *available forces and across all domains* to accomplish the mission. Further, influence can be described as: the capacity to leverage capabilities outside traditional command structures. Armed with this contemporary understanding of the operating environment and of Command and Control, it is now important to apply this concept to the Air Force’s current and future C2 models.

At the most fundamental level, C2 functions as the connective tissue linking sensors to effects. In this capacity, commanders are able to leverage their unique authority to exercise control over specific resources in order to achieve a desired effect. While this centralized and vertical control has been sufficient in past operations, in complex, multi-domain conflicts the

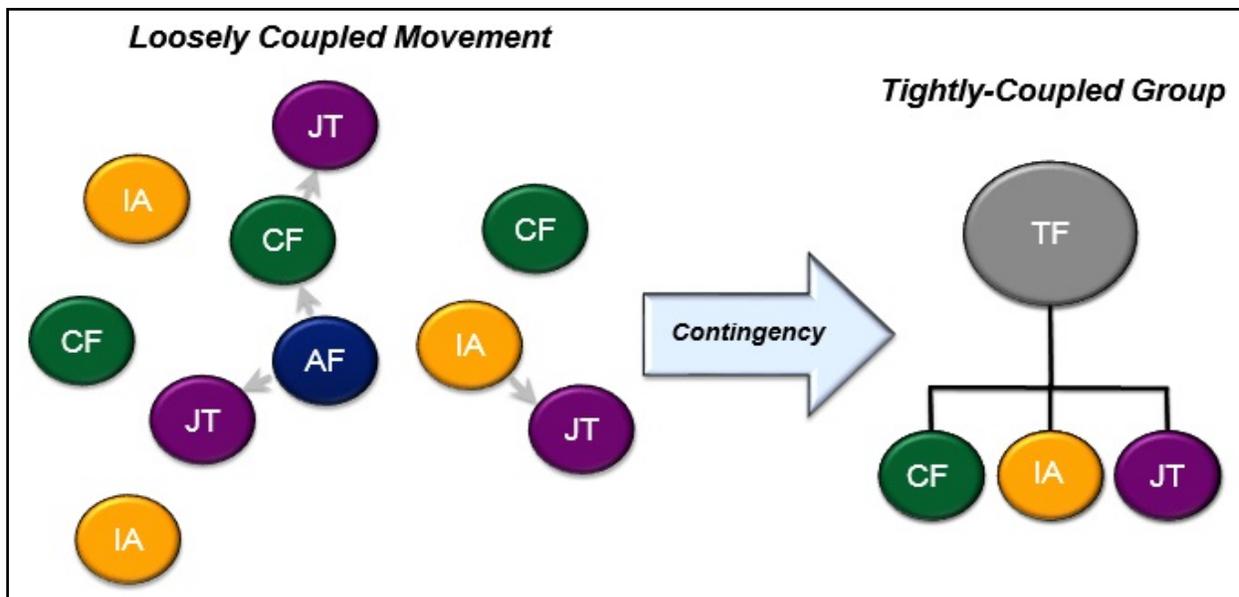
most effective capability to achieve a desired end-state often resides with a partner organization outside the scope of a commander's control. Formal tasking processes have been established to create a mechanism that allows organizations to leverage these external capabilities and overcome operational constraints; however, utilizing these processes introduces a time and potential quality cost that commanders must address.

While formal tasking processes have become incredibly efficient, they do not occur instantaneously even within highly dynamic environments. Critically, even if the time cost is minimized, it still can yield a competitive advantage to an adversary in a complex, multi-domain conflict. Further, while formal tasking processes provide an effective means for commanders to leverage external capabilities, they do not address the quality cost grounded in the potential lack of understanding between the organization and the new asset. More specifically, an organization may not truly understand the new asset's capabilities and limitations and, conversely, the newly acquired capability may not have a comprehensive understanding of the commander's strategic intent. As a result, the outcome of the formal tasking process may be one that effectively incorporates a required asset into a new C2 hierarchy but achieves an effect that is not aligned with commander's strategic intent. These operational realities emphasize the need to recognize influence's central role in Command and Control.

When working to understand how influence can be leveraged within the Air Force's Command and Control framework, it is valuable to look towards terrorist networks and non-state actors as a model. While the U.S. undoubtedly maintains a significant technological advantage over terrorist organizations' C2 capabilities, it can be argued that these non-state actors maintain an asymmetric advantage over the U.S. in the form of adaptive C2. The RAND Corporation's Brian Jackson provides compelling research that works to classify terrorist organizations based

upon their C2 methodology.⁸ Jackson's research serves as an excellent framework to better understand the Air Force's current C2 model and to identify how the future iC2 model leverages influence as a key component.

At both the inter-service and the national levels, the Air Force exists within a Loosely Coupled Movement. A Loosely Coupled Movement can be defined as an organization that has a slight connectivity at the strategic level; however, at the operational and tactical levels, the components of the organization operate independently.⁹ At the micro-level, these components can be individuals or Squadrons while, at the macro-level, these components are larger hierarchies exercising vertical control over their own organization. Because of the limited tactical or operational connectivity, independent components of a Loosely Coupled Movement pursue the same, broad strategic objective; however, their specific actions operate in parallel and often do not complement each other or have synergistic effects.¹⁰



The Air Force's Current C2 Model¹¹

A critical disadvantage of the current Air Force C2 model becomes apparent when a Loosely Coupled Movement is forced to respond to a contingency event. In this situation,

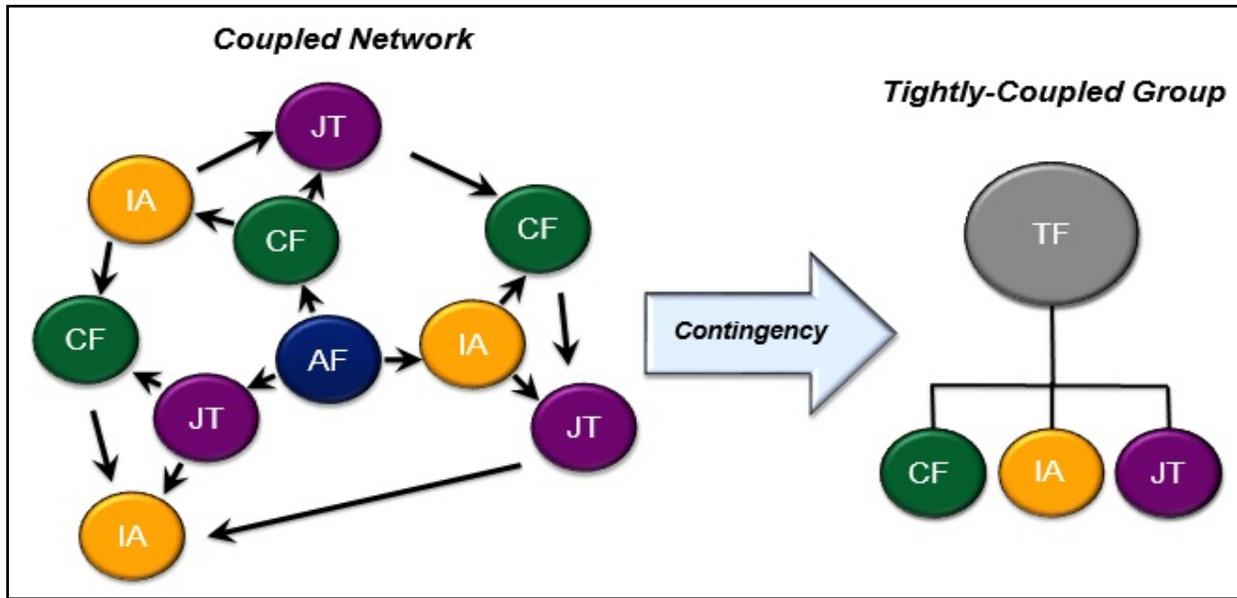
specific components of the organization are combined into a new hierarchy, or Tightly-Coupled Group, in an effort to consolidate the necessary capabilities to achieve a desired effect.¹² A traditional example of this transition can be found in the establishment of a Combined Joint Task Force (CJTF), where specific elements of a Loosely Coupled Movement are placed below a single commander in order to accomplish a specific mission. While this effort works to improve an organization's ability to effectively respond to an emerging threat, the transition from a Loosely Coupled Movement generates a significant time and quality cost. Notably, these costs are significantly increased by the lack of pre-established influence relationships across the Loosely Coupled Movement prior to the contingency event occurring.

The time and quality costs associated with the transition from a Loosely Coupled Movement to a Tightly-Coupled Group can be crippling in a highly dynamic, multi-domain conflict. While a new hierarchy and its corresponding wire diagram can be rapidly generated on paper, the reality on the ground is often vastly different. Because pre-established influence relationships are not prevalent across a Loosely Coupled Movement, components of a new Tightly-Coupled Group may find themselves organizing and working together at the tactical and operational levels for the first time. Therefore, while organizationally the new C2 element may rapidly integrate, its ability to operate effectively and achieve a desired end-state may take much more time. Further, the newly established Tightly-Coupled Group will experience a steep learning curve as components begin to understand new partner capabilities and limitations as well as a new commander's strategic intent in the midst of a dynamic, contingency environment.

In light of these operational constraints, there are deliberate planning processes in place that work to minimize the aforementioned time and quality costs. By developing an Operation Plan (OPLAN) prior to a contingency event, new C2 elements and the capabilities that will be

leveraged in a specific conflict can be pre-defined. However, these planning processes utilize a reductionist approach to solve an inherently complex problem.¹³ More specifically, while deliberate planning efforts work to improve the transition's efficiency, they are limited by an ability to predict future contingency events and the necessary capabilities that will be leveraged in response. Importantly, the ability to predict future contingency events is significantly degraded in complex operating environments.¹⁴ Further, complex challenges facing C2 networks in multi-domain operations do not yield to improved efficiency or prediction and, instead, rely on increased adaptability.¹⁵ In order to improve the adaptability of the current C2 model, the Air Force must move beyond a Loosely Coupled Movement and begin to operate within a Coupled Network.

As a Coupled Network, the Air Force's future Command and Control model of iC2 will work to reduce the time and quality costs incurred by the organization at the outset of a contingency operation. With this in mind, a Coupled Network is defined as an organization with increased connectivity between independent components at the tactical and operational levels in order to ensure that effects complement each as they work towards a broad, strategic goal.¹⁶ Importantly, in the iC2 model, increased connectivity across the organization is established through horizontal, influence relationships with service, joint, interagency, and coalition partners. By pre-establishing influence relationships with components outside a commander's sphere of control, the time and quality costs incurred when the organization transitions to a Tightly-Coupled Group are reduced. This cost reduction reveals the fundamental strength of iC2: by establishing and leveraging influence relationships prior to a contingency event, an organization is able to capitalize on the inverse correlation of influence to time and quality costs.



The Air Force's Future iC2 Model¹⁷

By pre-establishing influence relationships and operating as a Coupled Network, an organization is able to expand the potential sensor and effect options available to a commander without necessarily having to leverage a formal tasking process. More specifically, in the iC2 model, once a new Tightly-Coupled Group is established in response to a contingency event, it becomes a new component of the Coupled Network, re-establishing influence relationships across the organization. As a result of complementary effects occurring across the organization at the tactical and operational levels, the commander may not need to exercise formal control over a capability to achieve a specific and desired end-state.

Finally, the iC2 model works to empower decision makers at the lowest level by breaking down information silos across the Coupled Network.¹⁸ With iC2, individuals and components are able to make tactical decisions that are grounded in an improved understanding of external capabilities, limitations, and the strategic objective towards which the network is working. As a result, warfighters at the tactical level are empowered to make decisions that result in

complementary effects across the network rather than ones that solely impact their specific mission or asset.

In order to realize the implementation of iC2 beyond a doctrinal expansion, the Air Force must prioritize personnel and materiel solutions that recognize the importance of influence in Command and Control. People, more than doctrine or systems, will pave the way for a transformational cultural change within the Air Force and at the national level by actively changing the way others around them think. The Air Force currently utilizes Weapons Officers (WO), Liaison Officers (LNO), and exchange assignments to establish influence relationships across organizations. These career-broadening experiences provide an effective baseline; however, in order to exploit the full potential of these positions, more significant changes must occur.

The Weapons Officer (WO) community serves as a particularly effective model for how to leverage informal influence relationships successfully at the micro-level. They are trained to be not only tactical experts, but also liaisons and ambassadors for their specific field, enabling them to effectively develop a large sphere of influence in the Air Force. Weapons Officers have a distinct advantage in the use of peer-to-peer networking by already having contacts established through Weapons School training, which involves and integrates multiple Major Weapons Systems (MWS) and support agencies throughout the course. Their intensive training creates an environment for quickly developing contacts and rapport within the WO community, as well as instantly recognizable points of contact, or “belly buttons”, within various organizations they can leverage for support. Unfortunately, establishing a WO-level course for every career field is infeasible; however, the concept of having readily identified liaisons is a valuable idea and warrants further exploration.

As with the WO community, Liaison Officers (LNOs) are another pre-existing group with significant influence potential. While the LNO position is not a new concept, it has yet to be viewed in the Air Force as a force multiplier in Command and Control, with an emphasis on growing and leveraging influence relationships. Developing LNOs and teaching them the foundations of iC2 would empower them to build lateral relationships across organizations and enhance their ability to provide commanders with a greater sphere of influence when conducting operations. Furthermore, taking a page from the WO concept, LNOs should begin to proactively create networked relationships for future contingency operations. LNOs serve as the key terrain to begin developing a tangible representation of established influence relationships inside hierarchical structures. Therefore, the Air Force must increase the total number of LNOs and make a deliberate effort to improve their quality through a vetting process and training pipeline commensurate with the criticality of the liaison role.

Improving and employing WOs and LNOs fully is the necessary first step to developing a personnel solution for iC2. Additional methods such as exchange assignments, crossflow opportunities, and integration of iC2 training into existing Professional Military Education (PME) needs to be explored and implemented as well. Nevertheless, in order to harness the full potential of this concept, the Air Force must look beyond the scope of these two positions and develop a role that codifies and applies these best practices at the macro-level. This new, Integration Officer (IO) position--scalable to the service and national levels--would serve as either a career track or even its own career field. In either form, it would develop officers with an understanding of how to create both operational agility and cross-domain synergy. By developing a career path that allows Airmen to specialize in the art and science of effectively integrating with service, joint, interagency, and coalition partners, the Air Force can begin to lead

the way in creating a shared operating environment among the various organizations that respond to a given contingency.

Another key solution to further develop iC2 is the establishment of a Common Operating Picture (COP) that can rapidly and seamlessly integrate our coalition partners. The North Atlantic Treaty Organization (NATO) provides an excellent model, as it is currently working to develop an improved COP for the 21st century across a coalition environment. NATO Air to Ground Surveillance (AGS) is a system in which partner nations will all have access to ISR capabilities from a NATO owned and operated Global Hawk program. Importantly, this program is designed to succeed in today's complex, dynamic environment and serves as a model for future coalition systems.

Fully realizing a comprehensive solution for Command and Control depends on developing and employing systems that enable and encourage formal control and informal influence relationships. In order to do so, the Air Force must begin to move beyond the current hub-and-spoke model for C2 infrastructure. Instead, an improved C2 system must look towards point-to-point solutions that leverage a meshed topology approach that creates redundancy while maximizing horizontal communication. Systems such as the Battlefield Airborne Communication Node (BACN) have worked to connect widely dispersed sensors and effects; however, its capability in Anti-Access/Area Denial (A2/AD) environments has been limited. Further, the Air Force has pursued Air Operations Center (AOC) modernization programs that integrate C2 software across the AOC; however, these initiatives only worked to affect the service-level. The Air Force must develop C2 system solutions that can be scaled beyond the service and can seamlessly interact with and enable interagency and coalition partners. Further, these systems must be similarly capable across the demands of a complex multi-domain

environment, providing effective C2 in permissive, counterinsurgency operations as well as in non-permissive, A2/AD environments.

While systems should undoubtedly be developed “from the ground up” that are uniquely designed to address these requirements, the Air Force should also look towards solutions that leverage pre-existing infrastructure in non-standard ways. A potential solution is to leverage the adversary’s existing commercial network infrastructure to communicate across domains and with service, interagency, and coalition partners. This solution recognizes the inherent complexities in A2/AD environments and does not depend on air and space superiority to establish systems that create effective horizontal communication across the organization. Further, because commercial network infrastructure has drastically grown in quantity and quality in recent years, it would be extremely difficult to detect small amounts of data being transmitted during an operation in the midst of the overwhelming volume of commercial data traffic. Unique and non-standard system solutions such as this must be pursued in order to provide a comprehensive solution to this complex problem.

Beyond personnel and materiel solutions, policy impacts on developing effective C2 must be considered. Prior to the Goldwater-Nichols Act of 1986, there was limited incentive for officers to gain joint experience across the services. This lack of experience became a significant factor in Operation Eagle Claw, the failed attempt to rescue hostages from the U.S. Embassy in Iran. Notably, the Act reorganized joint officer management policies and created a requirement for joint experience prior to progressing in rank above O-6. This requirement incentivized joint experience and provided the motivation and drive for officers to work with and for other military branches. By using policy to establish the joint experience requirement, the culture across the Department of Defense was changed and the value of joint experience increased exponentially.

While this has had a significant impact on the military services, there are still many other organizations that work with the U.S. military but have yet to be included. These organizations range from government agencies to non-governmental organizations (NGO) to coalition partners. By expanding the joint officer management policies to include these additional entities, the relationships and information shared would benefit partners who work together on a daily basis. As a result, information silos and stovepipes that exist throughout the U.S. Government would begin to be eliminated and the conditions for implementing iC2 would begin to be established.

In order to develop a concept of operation driving towards a solution to the global C2 problem, the Air Force must begin by recognizing the value of influence and expand the doctrinal understanding of Command and Control to iC2. Once the doctrinal shift from traditional C2 to iC2 occurs, the focus should transition to people, training, and career experience to create the requisite formal and informal influence relationships. While performing these necessary steps, the Air Force must continue to invest in future systems utilizing a mesh topology approach to further enhance these influence relationships. The Air Force's continued success in complex operating environments depends on the development of an adaptable C2 infrastructure that is scalable, networked, and global.

No matter what system solution is developed, the Air Force must be sure that it can be applied in a coalition and interagency fight. Service-specific COPs must be rapidly shared and integrated with interagency and coalition partners. Furthermore, the Air Force must be able to fuse these disparate operating pictures into an easily accessible product that enables decision makers at all levels. As expressed in the "Air Force Strategic Master Plan", the Air Force's roadmap for the future, "the Air Force must aggressively pursue a path that leads to the institutional strategic agility required to adapt and respond faster than our adversaries in an

increasingly dynamic environment characterized by constrained resources.”¹⁹ The only way to meet these demands is by leveraging the power of influence relationships at all levels, across all barriers, and through a fundamental shift in our mindset as we continue to operate in this brave new world.

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