IADS
Day 3 - Reading #1

USAF Public Affairs
Strong Alliances and Interoperability

AIR FORCE

US Air and Space Forces senior leaders emphasize need for strong alliances and ‘interoperability’ on European tour

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ARLINGTON, Va. (AFNS) -- The senior-most civilian and military leaders of the Air and Space Forces crisscrossed Europe the week of July 10 carrying separate itineraries but a singular message - the importance of tight relationships with allies and partners, and the need to forge seamless "day-zero interoperability" that is "integrated by design."

In a series of engagements that spanned Italy, Germany and several in the United Kingdom, Department of the Air Force Secretary **Frank Kendall**, Air Force Chief of Staff **Gen. CQ Brown, Jr.**, and Chief of Space Operations **Gen. John “Jay” Raymond** each stressed that, to confront and deter China, Russia and other threats, a seamless and multi-domain collaboration with international allies and partners is essential.

"Our next global threat may achieve parity, technologically, economically, or militarily, but the leading edge we have is each other," Brown said July 14 in a **keynote** at the 2022 Global Air & Space Chiefs' Conference in London.

"And, in order to maintain that leading edge, we need to take an integrated approach in how we manage our people, policies and processes," he said at the conference, which is a high-profile gathering of service chiefs and senior defense policy makes from around the world.

In prepared remarks to the same conference on the same day, Raymond highlighted similar themes while also focusing on the importance of space and how the U.S. and allies are accelerating partnerships and cooperation in that critical domain.

"We recognize the character of war has changed, with growing kinetic and non-kinetic threats across multiple domains, and now explicitly against assets in space," Raymond said. "And because space underpins the Joint Force, threats against space also threaten our ability to conduct operations in the air, on land, and at sea.

"Therefore, we must be coalition-minded from the start. We are stronger together, and we see clear advantages when we plan, train, and operate as a team. Luckily, we're not starting from scratch on this," Raymond said.

Kendall linked up with Brown and Raymond at the **2022 Royal International Air Tattoo**, which is considered the world's largest military air show and a long-running event in Britain. In addition to drawing an estimated 170,000 spectators, this year's edition also included a celebration of the U.S. Air Force's upcoming **75th anniversary**.

"These forums are valuable and serve a crucial need to bring together like-minded nations and their militaries who honor common values," Kendall said. "In a short span of time, we met many allies, reinforced our ties and exchanged ideas on future collaboration in support of security and stability."

Kendall also attended the Farnborough Air Show, one of the most significant events in the air and space industry.

"When we say one team, one fight -- industry and our international partners are part of that team," Kendall said. "As we work together to **accelerate change**, we want to tap into the intellectual capital and creativity industry brings to the table, and this includes our international partners.

“We must work together to modernize our capabilities. The firms and national programs I’ve seen on this trip impress me, and it gives me confidence that we can work collaboratively across our department and with our allies and partners to prepare for tomorrow's fight, today,” he said.

The threats are well understood and tangible.

Russia's unprovoked invasion of Ukraine has brought large-scale warfare–back to Europe. China continues to expand and modernize its military capabilities while also lengthening its geo-political and economic reach.

Raymond described it this way to colleagues at the Air and Space Chiefs Conference - competitors, he said, are seeking "to turn the global security system on its head and rewrite the rules in their favor and according to their authoritarian view of the world. This threatens global stability and efforts for peace.

The proper response and the official posture of the United States is a concept Defense Secretary **Lloyd Austin** calls "integrated deterrence," an approach that merges the joint force, allies, and partners into a coordinated and formidable force that has capabilities in the air, land and sea, as well as space and cyber.

Integrated deterrence, Raymond said, "is a framework across all warfighting domains, theaters, and the spectrum of conflict, in collaboration with all instruments of national power, and, importantly, with our allies and partners."

A key feature that must be present in order to succeed, Brown said, are strong bonds with allies and partners and an approach to these relationships he called "integrated by design."

"Integrated by design is the deliberate way we work together to understand the environment, define the threat, share information, and, most importantly, employ airpower. To become integrated by design and overcome emerging global challenges, we need to relook at our approach in three areas: people, policies, and processes," he said.

"For me, integrated by design means we start with allies and partners in mind versus building the U.S. first, then adapting to include allies and partners," Brown said, adding, "the U.S. Air Force must take more risk to work within existing policies where we haven't done so in the past.

"… We have to open doors to our allies and partners to address future military challenges. Just because something is difficult, or we have not normally done it, is not a good reason to avoid it."

Brown highlighted allies and partners coming together to counter Russian aggression as an example of working together to address such challenges.

"Investments in collaboration and trust work. They worked against ISIS and are working against Russia. Now, to maintain our leading edge and the current rules-based international order, one thing is clear: the U.S. and our allies and partners, must integrate like never before," he said.

Raymond stressed similar points and goals earlier in the trip during a stop in Italy.

In remarks prepared for a July 11 speech before the NATO Defense College in Rome, Raymond acknowledged the **Space Force**, and by extension, the U.S., "cannot go it alone."

"In the face of this threat to international security, the Space Force recognizes we cannot go it alone but must instead act as a member of a coalition. Which means working through differences, establishing common goals, frameworks, and plans, as well as training and operating together," he said.

IADS
Day 3 - Reading #2

AF Doctrine Note 1-21
Agile Combat Employment

AIR FORCE DOCTRINE NOTE 1-21

AGILE COMBAT EMPLOYMENT

U.S. AIR FORCE

23 August 2022

CURTIS E. LEMAY CENTER
FOR DOCTRINE DEVELOPMENT AND EDUCATION

AIR FORCE DOCTRINE NOTE 1-21

AGILE COMBAT EMPLOYMENT

23 August 2022

From its founding, the US Air Force has been tasked with projecting combat power across the globe. Historically, it has relied on a combination of continental US and overseas air bases to allow for relatively uncontested movement and operational reach to posture and employ forces and capabilities. However, since the Cold War ended, the Air Force has significantly reduced its global footprint. From 93 air bases during World War II, the Air Force presently maintains 33 permanent overseas air bases[1], a 65% reduction. This reduction challenges the Air Force's ability to project power and simultaneously concentrates friendly high value assets for potential adversary action.

Concurrently with the global footprint reduction, adversarial technological advances in pervasive intelligence, surveillance, and reconnaissance and all-domain long-range fires have placed air bases at significantly increased risk. Just as the Soviets placed Cold War bases in Europe at risk, new weapons systems now place bases at risk that were previously considered sanctuaries. Additionally, fiscal and political constraints limit the establishment of new permanent air bases. To address these challenges, the Air Force introduced **Agile Combat Employment (ACE): a proactive and reactive operational scheme of maneuver executed within threat timelines to increase survivability while generating combat power**.

When applied correctly, ACE complicates the enemy's targeting process, creates political and operational dilemmas for the enemy, and creates flexibility for friendly forces. To effectively accomplish joint force commander objectives, ACE requires reexamining a wide variety of enabling systems, to include: command and control (C2), logistics under attack, counter-small unmanned aircraft systems, air and missile defense, and offensive and defensive space and cyber capabilities.

ACE is an operational concept that supports joint all-domain operations (JADO). Joint force operations are increasingly interconnected, interdependent, and challenged. Anti-access and area denial threats, reduced freedom of maneuver, and rapid proliferation of advanced technologies challenge the Air Force's ability to operate. The successful employment of ACE positions the force to observe, orient, decide, and act in concert across all domains. To achieve freedom of action, ACE enables convergence across

[1] Department of Defense, *Base Structure Report – Fiscal Year 2018 Baseline* (Washington, DC: Deputy Assistant Secretary of Defense [Infrastructure], 2018).

domains, presenting an adversary with dilemmas at an operational tempo that complicates or negates adversary responses and enables the joint force to operate inside the adversary's decision-making cycle.

> *"The best place to kill an enemy's air force is on the ground. Especially if that air force is postured in bases that are few in number and lack passive defenses — such as shelters and decoys — and active defenses such as kinetic and non-kinetic interceptors, electronic warfare, and directed-energy weapons that can help counter these air and missile threats."*
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> **-- Mark Gunzinger**
> Director of Government Programs and War Gaming,
> Mitchell Institute for Aerospace Studies

This doctrine note is intended to guide the development of ACE within Air Force operational doctrine. It establishes working definitions and a framework for ACE doctrine development. It includes an overview of evolving doctrine topics and provides the starting point for Airmen to codify best practices for ACE. This doctrine note focuses on ACE enablers and the ACE framework. It lays the foundation for the future development of ACE doctrine, aligns with the joint functions, and focuses on planning, execution, and assessment for operations executed from competition through conflict.

DEFINITIONS OF KEY TERMS

Agile: Able to outpace adversary action through movement and maneuver to achieve commander's intent.

Agile Combat Employment: A proactive and reactive operational scheme of maneuver executed within threat timelines to increase resiliency and survivability while generating combat power.

Base cluster: A base cluster is a collection of bases, geographically grouped for mutual protection and ease of C2.[2]

Within the context of ACE, base clusters typically involve the organization of an enduring location with one or more contingency locations (CLs) to establish a regional boundary, wherein the enduring location commander commands one or more CLs with appropriate authorities to direct their activities.

Conditions Based Authorities: A published set of authorities that are delegated down the chain of command from one commander to another, to be activated only when specified conditions are met.

[2] DoD Dictionary of Military and Associated Terms, November 2021.

Hub and spoke distribution: A physical distribution system, in which a major port serves as a central point from which cargo is moved to and from several radiating points to increase transportation efficiencies and in-transit visibility.[3]

Mission Command: An approach to C2 that empowers subordinate decision-making for flexibility, initiative, and responsiveness in the accomplishment of commander's intent.[4]

The core principles of mission command are: build teams through mutual trust, create shared understanding, provide clear commander's intent, use mission-type orders (MTO) when appropriate, exercise disciplined initiative, and accept prudent risk. Airmen execute mission command through centralized command, distributed control, and decentralized execution.

Multi-Capable Airmen (MCA): Airmen trained in expeditionary skills and capable of accomplishing tasks outside of their core Air Force specialty.

Specifically, these personnel are often trained as a cross-functional team to provide support to ACE force elements. They are enabled by cross-utilization training and can operate as part of a team in an expeditionary environment to accomplish mission objectives within acceptable levels of risk.

Proactive Maneuver: A scheme of maneuver by which forces and assets are moved between operating locations (see appendix) to assure allies and partner nations of US support, alter adversary or enemy understanding of friendly intentions and capabilities, posture to deter aggression, or gain advantage.

Reactive Maneuver: A scheme of maneuver employed in response to observed, perceived, anticipated, or realized enemy aggression using mobility and dispersion of forces and assets to complicate enemy targeting, redistribute forces away from concentrated hubs, increase survivability, and reposition forces for follow-on operations.

Threat Timelines: Theater-specific planning factors based on the time required for an adversary to accomplish its find, fix, track, target, engage, and assess cycle.

Note: The above definitions are derived from a variety of sources and are placed here to facilitate further discussion. Their establishment in Service and joint doctrine varies. Though doctrinal, they may evolve as knowledge and understanding of ACE operations progresses.

HOW IS ACE DIFFERENT?

The US may face adversaries capable of wielding a disruptive and dangerous operational reach with mass, precision, and speed in all domains. Adversaries can challenge our ability to project power from enduring locations, often large and centralized physical structures with unprotected infrastructure. To address this threat, ACE shifts operations from centralized physical infrastructures to a network of smaller, dispersed locations that

[3] DoD Dictionary of Military and Associated Terms, November 2021.
[4] Air Force Doctrine Publication-1, *The Air Force.*

can complicate adversary planning and provide more options for joint force commanders. Its value is derived from the ability to hold adversary targets at risk from multiple locations

ACE Operations, Activities, and Investments ACE operations present commanders with options to initiate, continue, or re-establish operations while balancing associated risk factors, as shown through a few examples below.	
Continuum event	**ACE operations, activities, and investments**
Cooperation	✪ Create steady-state and contingency authorities with partner nations which allow for: overflight, direct coordination with host nation defense, staging of material/equipment, etc. ✪ Organize, Train, and Equip forces for ACE constructs ✪ Build interoperability with allies and partners
Competition	✪ Exercise ACE operations and conduct capability demonstrations with joint forces and partner nations as an active deterrent to conflict ✪ Maintain freedom of access and maneuver
Conflict	✪ Conduct persistent mission generation and logistics under attack ✪ Complicate enemy observe-orient-decide-act loop ✪ Preserve combat capability ✪ Generate combat power

that are defensible, sustainable, and relocatable. Airmen should expect to conduct operations at a speed, scope, complexity, and scale exceeding recent campaigns from distributed locations.

ACE ENABLERS

Freedom of action and decision advantage can be achieved by forcing complex target situations to create multiple adversary dilemmas. This **deters** aggression and enables the US to **defend and win** in conflict.[5] ACE achieves this through the following enablers:

- ✪ Expeditionary and Multi-Capable Airmen.
- ✪ Mission command.
- ✪ Tailorable force packages.

EXPEDITIONARY AND MULTI-CAPABLE AIRMEN

The Air Force must refocus on the expeditionary skills necessary to operate outside of enduring locations. Many Airmen must have diverse foundational skills that enable them to operate in a contested, degraded, and operationally limited (CDO) environment with minimal support. Leaders mitigate risk to force by training Airmen to execute distributed operations that increase survivability while generating combat power.

ACE teams consist of unit-assigned multi-capable Airmen. These teams are tailored portions of force packages able to provide mission generation (MG), command and control, and base operating support (BOS) as the mission dictates. Functional

[5] COMUSAFE Public Affairs preparation for Military.com interview, 4 May 2020.

communities must identify how to minimize equipment and personnel footprints to increase dispersal capabilities and complicate adversary targeting. The use of MCAs can reduce the number of people who must be put in harm's way to generate airpower relative to traditional manning models.

MISSION COMMAND

In future peer conflicts, the US should not expect to achieve the air supremacy it enjoyed in recent low intensity operations. Rather, it is more likely that every domain will be contested and characterized by fluctuating levels of superiority. By empowering subordinates at the lowest capable level to make decisions and take decisive action at their level, mission command provides the flexibility and agility required to seize opportunities despite enemy denial or degradation of communications.

To actualize mission command and its precepts, USAF leaders must expand their operational perspective beyond their role in executing the air tasking order. Through clear communication of commander's intent, Airmen must develop a detailed understanding of the area of operations and how the senior commander envisions winning the fight. Requisite details include: enemy situation, friendly situation, joint force and air component operational priorities, phasing and sequencing of the operation, logistical and sustainment priorities, delegated authorities, and overall risk management. These details are contained in mission-type orders (MTOs), starting with a standard 5-paragraph operations order (OPORD) to provide a snapshot of the commander's intent. The OPORD communicates the purpose of the operation, desired end states, the method designed to conduct it, and the resources available for execution. Armed with this shared understanding, subordinate leaders can make effective decisions consistent with commander's intent even if they've lost contact with higher echelons. Properly implemented, commander's intent should align subordinate unit efforts and enable the fight to continue with unity of purpose until updated information is received.

TAILORABLE FORCE PACKAGES

To meet theater requirements, ACE requires tailorable force packages with the ability to execute across a range of operating locations. Force structure and unit type codes (UTCs) must be designed to enhance agility while also balancing risk to mission and force. Functional communities work with commanders to define ACE force packages that will be reflected in existing, new, or updated UTCs.

> *"To generate combat power from a number of locations to create dilemmas for an adversary...I just need a runway, a ramp, a weapons trailer, a fuel bladder, and a pallet of [Meals, Ready-to-Eat]. That's maybe a little bit bold, but the point is, we've got to be light, lean and agile."*
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> **-- General CQ Brown, Jr., Chief of Staff of the Air Force**
> Remarks to Air Force Association Air, Space, and Cyberspace Conference
> as Commander, Pacific Air Forces, September 2019

ACE FRAMEWORK

To provide a common lexicon with joint partners, ACE consists of **five core elements**: **posture**, **C2**, **movement and maneuver**, **protection**, and **sustainment**. The latter four align with the joint functions. Together with the remaining joint functions (information, intelligence, and fires), the five core elements form the whole of ACE's operational framework.

POSTURE

Posture is intrinsically tied to all other elements. It is the starting position from which subsequent actions take place. **Forces must be able to rapidly execute operations from various locations with integrated capabilities and interoperability across the core functions.** When executed properly, posture establishes a deterrent to conflict by being strategically predictable, but operationally unpredictable. An effectively tailored posture provides commanders with expanded force employment options and mitigates operational risk. It enhances defensive posture by increasing the scope and scale of friendly force locations, boosts deterrence to adversary aggression, and assures allies by presenting a credible combat force.

Posture redistributes both theater-assigned and follow-on forces to positions of advantage to best support operations plan execution. Enduring locations should be robust and should have the ability to support further dispersion to smaller CLs while maintaining integrated capabilities and interoperability across MG, C2, and BOS functions.

Operational unpredictability is enabled through the agility of forces across pre-postured locations, increasing the number of locations an adversary must target. The increased number of dispersed locations presents adversaries with challenges from the tactical to the strategic level. It does this politically through nation agreements and financially by increasing the numerical offensive capability required to achieve intended effects.

Operational locations should be identified based on the ability to support warfighting requirements and sustainment opportunities while balancing risk to force. Risk to force may prohibit massing personnel at locations inside enemy weapon engagement zones (e.g., unconventional ground forces, small unmanned aircraft systems [sUAS], ballistic missiles, cruise missiles, and hypersonic weapons). Risk management is critical to balance survivability with combat operations tempo by stationing forces at varying proximities to the fight and associated threats. Providing the flexibility to rapidly reroute forces and equipment inbound to the theater is critical to successful ACE.

Access, basing, and overflight are essential to the successful application of ACE. Theater operational planners should focus ACE efforts in day-to-day operations and activities on strengthening alliances through trust, and increasing partner capacity and capabilities. Planners should also understand partner nation access agreements, and may seek opportunities to increase the number and range of those aggreements through a "whole of government" approach. To achieve optimal sourcing decisions and enable ACE objectives, planners should consider acquisition and cross-servicing agreements, host-nation support agreements, and integration of operational contract support equities

across the air component command staff functions. As the quality and quantity of operational locations increase, ACE exponentially increases both the operational advantage to friendly forces as well as the political and operational dilemma for adversaries.

Distributed operations will exist on a spectrum, from well-developed enduring locations to potentially austere CLs. To ensure support to distributed forces, it is vital to understand the local and regional market's capacity to source critical operational requirements. When developing a new CL, planners should consider referencing multi-Service tactics, techniques, and procedures for airfield opening[6] to determine planning considerations and improvements required. Infrastructure improvements and associated prepositioning of materiel at distributed operating locations may be necessary to ensure respective theater plans are executable. Required capability development includes:

- Equipment and supply pre-positioning.
- Scalable logistics packages.
- Access to forward operating sites, including partner military and civil airfields.
- Resilient communications to function in contested, degraded, or operationally limited (CDO-L) environments.
- A force optimized for large scale combat operations in a contested environment.

COMMAND AND CONTROL (C2)

Commanders in any conflict require the ability to conduct C2 across domains. The C2 challenges presented in this doctrine note are not unique to ACE. These challenges exist in all large scale combat operations, but are complicated further when forces disperse from enduring locations. Centralized command, distributed control, and decentralized execution provide the framework for the C2 of ACE.[7] Airmen should be able to translate C2 information into action with sufficient speed and scale, regardless of the operational environment. Airmen should be trained and equipped to employ communications equipment to support distributed operations.

Joint all-domain command and control (JADC2) and mission command enable Airmen and joint partners to gain operational advantage, maintain operational effectiveness, and achieve convergence of effects across domains. This is accomplished via the communication of commander's intent through issuance of MTOs in conjunction with delegated and conditions-based authorities, allowing operational commanders to generate combat airpower in a CDO-L environment. It should be expected and anticipated that force elements conducting ACE will lose connectivity with operational C2; therefore it is imperative that units be trained to operate via commander's intent with limited direction from air operations centers or air component staffs. Plans must be flexible and

[6] Air Force Tactics, Techniques and Procedures 3-2.68, *Multi-Service Tactics, Techniques, and Procedures for Airfield Opening*. Common access card-enabled site.
[7] AFDP-1.

commander's intent must provide the latitude needed to adapt to changing circumstances not foreseen beforehand. In situations where communications are degraded and forces lack continuous contact with higher echelon commands, Airmen should execute in alignment with commander's intent to protect and preserve the force. Additionally, they should take advantage of emergent opportunities which allow forces to maintain the initiative, and resolve situations locally based on a subordinate commander's own situational awareness. Codification of conditions-based authorities and delegated authorities will maximize the advantages provided by emergent opportunities.

JADO requires command authorities to be flexible and responsive to battlespace changes with respect to time, geography, communications, and command relationships. Because of distributed control's inherent complexity, specified elements of operational, tactical, and administrative control should be developed early, adapted to the situation, and exercised during day-to-day cooperative and competitive activities. Within this construct, effective ACE requires significant coordination across Service component commanders and industry partners to organize efficiently. These relationships and agreements should be established and rehearsed well ahead of any potential conflict. To contend with CDO-L environments, command authorities should be delegated to the lowest appropriate level. In an ACE scheme of maneuver, distributed control drives additional planning and coordination requirements at echelons below the operational level. Forces should have information that enables them to understand the current and expected threat environment, the overall plan, their role within it, status of forces, available support relationships, and the means to be used for coordinating actions at the times and places required. Leveraging advances in automated systems from mission and industry partners (e.g., artificial intelligence, automation, and augmentation and human-machine teaming) will play an important role in managing the increased workload.[8]

JADC2 facilitates the unification of efforts across all domains to exploit the advantages of joint and partner nation capabilities, providing mission commanders an ability to rapidly develop, execute, or transition between kill chains to overwhelm adversary defenses and present the enemy with multiple dilemmas. Enhanced all-domain awareness, data sharing initiatives, and synchronization of forces translates decision advantage into operational advantage. Mission command supports combat effectiveness during the inevitable fog and friction of war.

Redundant and resilient C2 methods enable effective ACE execution. ACE requires communications that are mobile, survivable, secure, and sustainable across the electromagnetic spectrum to provide access to DOD networks and voice services in a CDO-L environment. When communications are challenged, commanders and subordinates should be prepared to execute pre-established multi-modal primary, alternate, contingency, and emergency plans. Exercises have demonstrated that codified active reporting procedures aid a commander's battlespace awareness in a CDO-L environment.

[8] AFDP 3-99, *The Department of the Air Force Role in Joint All-Domain Operations*.

MOVEMENT AND MANEUVER

ACE provides greater agility and ability to outpace an adversary's action through movement and maneuver to achieve and fight from positions of advantage. Agility is capable of disrupting an adversary's decision cycle by creating multiple dilemmas with which they must contend.

Maneuver includes expansion of operational footprints and access throughout the theater to provide flexibility, deter adversaries, and support partners and allies. ACE maneuver includes movement of forces to predetermined, dispersed locations and flow of dispersed forces back to an enduring location. The maneuver of forces in this manner is intended to enhance MG efficiency and simplify sustainment. It can provide the ability to push combat and support elements forward for limited periods of time to accomplish offensive objectives.

Dispersal operations complicate enemy targeting by either redistributing forces to multiple operating locations or redistributing forces within an established air base. Once dispersed, friendly forces maintain operational momentum via distributed control and mission command principles. Dispersal operations are augmented with other passive defense measures, such as hardening and camouflage.

ACE maneuver requires prioritization and sufficient coordination of theater assigned and inter-theater transportation to move the force at the proper time and with sufficient tempo to achieve desired effects. Early planning and posturing can ensure airlift, ground movement, and sealift are employed with sufficient quantity, speed, and flexibility. Properly integrated into the planning cycle, operational contract support planners can provide optimized sourcing recommendations and options for the use of commercial support to reduce air, ground, and sea transportation requirements. Dispersal plans from specific enduring locations to dispersed locations should be incorporated into theater operation plans to permit adequate equipment and personnel posturing as well as time phased force deployment data development.

For ACE to remain viable, ACE maneuver must be prioritized. Normally, the combatant commander retains control of theater assigned transportation assets. However, exercises have validated that organic transportation within a base cluster increases agility. This is accomplished with CCMD assigned or attached mobility forces through delegation of OPCON or TACON to the lowest applicable level, often to the Air Expeditionary Wing (AEW). Utilizing the hub and spoke distribution methodology, moving cargo between an enduring location (hub) and a CL (spoke), organic transportation increases the flexibility and agility of forces within an AEW's base cluster. It provides commanders maximum flexibility to rapidly maneuver forces and materiel based on each CL's need.

PROTECTION

Air bases are no longer considered a sanctuary from attack, regardless of their location. To stay in the fight, forces must operate in and through contested environments. A combination of active and passive defenses are necessary to counter threats in all domains. CL protection requirements, including base defense and defensive counter air

(DCA), are informed by operational risk assessments, mission requirements, and available protection capability and capacity. DCA is paramount to protect the force from present and future threats, including sUAS, cruise missiles, ballistic missiles, and hypersonic weapons.

A strategy that implements integrated air and missile defense (IAMD), to include layered DCA capabilities and robust defensive measures, complicates and frustrates enemy targeting. Additionally, all installations should be prepared to defend against air; space; cyberspace; surface-to-surface; chemical, biological, radiological, and nuclear; and ground threats throughout the conflict. Protection strategies enable Airmen to prevent, protect, mitigate, respond to, and recover from attacks while rapidly reconstituting and continuing to generate combat airpower throughout.

Enduring location-focused force protection plans and strategies are insufficient to meet the needs of short-term or dispersed operations. Preplanned integration of joint or host nation security assets for dispersed operations is paramount. Additionally, force protection intelligence support is critical to ACE. Proactively providing planners and commanders with information enables quality basing and risk mitigation decisions. Continuance of intelligence and counterintelligence (CI) activities throughout the competition continuum informs commanders' risk calculus when executing reactive maneuver or other protection actions. Air Force intelligence, CI, force protection, emergency management, and law enforcement entities should leverage existing relationships with joint and host nation entities to coordinate supplementary force protection and intelligence support for ACE. Finally, intelligence and CI entities should work closely with planners and supporting contracting activities to develop and maintain actionable information related to vendors and contractors in the region, especially regarding their potential allegiance to and partnership with an adversary.

SUSTAINMENT

ACE will challenge current logistics systems and transportation nodes. Supply and distribution systems need to transform from a fully connected "pull" system, optimized for efficient operations, to a "push" system that maximizes distributed mission effectiveness.[9] The Air Force should anticipate limitations to standard means of distribution and transportation, and leverage an adaptive logistics system to support operations in these environments. Leveraging local and regional commercial markets can alleviate distribution system stress and provide critical services and equipment to distributed forces.

ACE sustainment requires infrastructure innovation, operationalized war reserve materiel (WRM), and prepositioned equipment. Operationalizing WRM helps to ensure its continued viability over time and demonstrates logistical depth. Innovative logistics and force projection capabilities are required to meet operational ACE needs as operations grow in scope and scale due to the increase in operating locations.

[9] A pull system emphasizes efficiency through a "just in time" logistics system, where supplies are pulled forward on an as-needed basis. Whereas, a push system emphasizes effectiveness, at efficiency's expense, by anticipating the need and ensuring supplies are on hand before they are needed.

Current Air Force basing logistics systems are challenged to project, protect, and sustain the force in a dynamic, contested operational environment.[10] The processes of setting the theater, deploying the force, and maneuvering the force depend on robust, resilient, and responsive logistics and infrastructure support and must withstand an adversary's disruption strategy. To optimize ongoing sustainment, "push" logistics systems should employ predictive modeling predicated on mission design series (MDS) and theater-specific data analysis, accounting for variable geographical and environmental constraints and considerations across a theater. Additionally, analysis of commonalities between MDS common support equipment limits duplication of effort in the posture and sustainment of forces. Diversification of sustainment by using multiple sources such as support agreements and contracted support reduces stress on traditional logistics systems, contributes to maneuver unpredictability, and uses host nation resources.

As dispersed sites grow in number across a wider operational area, sustainment plans and systems should also be capable of scaling sustainment operations to match. ACE sustainment plans should focus primarily on aircraft sortie generation, but should also include the ability to execute implied tasks such as receiving airlift or sealift for resupply, executing BOS functions, and contracting local services, supplies, and equipment.

INFORMATION

Effective conduct of information warfare is a key element of ACE. All ACE actions, including written or spoken words and displayed or related images, have informational aspects that communicate some message or intent. This message or intent can be leveraged to shape perceptions and behaviors in ways that support the achievement of friendly force objectives. Overt messaging about ACE can be used to communicate the ability to rapidly disperse assets, aircraft, and personnel across a wide range of potential forward operating locations and leverage host nation organic capabilities, assets, and partner nation cooperative agreements.

In the planning and execution of proactive or reactive ACE schemes of maneuver, the deceptive use of information can cause an adversary to errantly diffuse or concentrate forces, rendering them ineffective. Similarly, it can create a state of "analysis paralysis" about ACE maneuver that challenges an adversary's ability to make effective, timely decisions.

ACE supports information warfare's aim of shaping the perceptions, behaviors, and attitudes of relevant actors.[11] The effective integration of information into ACE schemes of maneuver can bolster assurance and deterrence by revealing overall joint force capabilities to deny adversary benefits or punish aggression, conceal or obscure aspects that provide perishable advantage, or suggest elements that mislead adversaries. ACE preparation demonstrates and signals a combat-credible deterrent to adversaries and provides assurance to partners and allies.

[10] USAF Expeditionary Center, *Agile Combat Employment for Force Providers*, Version 2.0, 11 April 2020.
[11] AFDP 3-99.

INTELLIGENCE

Intelligence and CI should be prepared to support operations in a CDO-L environment characterized by mission command and rapidly changing basing. As operations evolve, real time communications feedback with warfighters and the intelligence community need to be agile and resilient. Mission report communications flow should be adapted for real time operations. Intelligence covering the full spectrum of ACE needs to adapt and evolve to meet dynamic C2 requirements.

Support to expeditionary mission generation units and the contingency intelligence network will further enable the ability to achieve desired airpower effects. Force protection intelligence and CI activities enable survivability of operations by providing commanders current, time-sensitive, critical information and intelligence necessary to make risk decisions regarding maneuver. This intelligence and CI gathering should precede operational ACE execution to identify all potential kinetic, nonkinetic, and foreign intelligence threats.

Intelligence preparation of the operational environment is employed to identify enemy capabilities and threats to proposed ACE operations and support their mitigation. The intelligence and CI community must also consider threats from commercial vendors and contractors. In locations without a current presence, the US should initiate and develop new relationships with individuals and organizations capable of providing desired information.

FIRES

ACE scheme of maneuver ensures the ability to mass fires to achieve convergence of effects in all domains, to include coordinated ground-based fires in defense of an airfield and its ability to generate aircraft. The execution of fires does not fundamentally change in ACE execution but requires use of MTO and delegation of authorities to the lowest appropriate level. Plans should account for the timelines that may be required to aggregate forces originating from different dispersed sites to create effects against a common target. Under the DOD's vision for JADO, fires may be delivered by air, space, cyberspace, land, maritime, and special operations forces.

CONCLUSION

ACE requires a revolutionary change in how the Air Force thinks about and conducts operations within the modern operational environment. This doctrine note informs relevant and forward-looking ACE concepts and provides a mechanism to quickly evolve doctrine to adapt to an ever-changing security environment. The intent of this doctrine note is to share information and generate discussion across the force. As ACE continues to mature through employment in field operations and exercises, feedback and lessons learned will continue to feed the evolution of this emerging doctrine.

APPENDIX A: QUICK REFERENCE LIST OF OPERATING LOCATIONS

Quick Reference List of Operating Locations

There are two predominant categories of operating locations that are typically referenced: enduring locations and contingency locations. Within these categories, it's possible to drill-down into sub-categories it further specificity is required.

Enduring Locations	Contingency Locations
Main Operating Base (MOB) – A facility outside the United States and its territories with permanently stationed operating forces and robust infrastructure.	**Semi Permanent Contingency Location (SCL)** – A contingency location that provides support for a prolonged contingency operation and characterized by enhanced infrastructure and support services consistent with sustained operations.
Forward Operating Site (FOS) – A scalable location outside the United States and its territories intended for rotational use by operating forces.	**Temporary Contingency Site (TCL)** – A locale that provides near-term support for a contingency operation and characterized by expedient infrastructure and support services that have been expanded beyond Service-organic capabilities.
Cooperative Security Location (CSL) – A facility located outside the United States and its territories with little or no permanent United States presence that is maintained by periodic Service, contractor, or host nation support.	**Initial Contingency Location (ICL)** – A locale occupied by a force in immediate response to a contingency operation and characterized by austere infrastructure and limited services with little or no external support except through Service-organic capabilities.

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Command and Control for Agile Combat Employment

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Command and Control for Agile Combat Employment

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Wild Blue Yonder -- The United States Air Force is using the term *agile combat employment* (ACE) to describe a way of operating that relies less on large traditional main overseas bases as hubs for projecting combat power and more on launching, recovering, and maintaining aircraft from dispersed forward operating locations in concert with allies and partners. This shift has been motivated by adversarial advances in reconnaissance and weapons capabilities that can hold at risk those bases that have traditionally been considered sanctuaries. ACE shifts operations from centralized physical infrastructures to a network of smaller, dispersed locations that can complicate adversary planning and provide more options for joint force commanders. Its value proposition derives from the ability to hold adversary targets at risk from multiple locations that are defensible, sustainable, and relocatable. Recent events such as the PACIFIC IRON operation have showcased the Air Force's flexibility in projecting power into forward locations.[1]

The potential benefits that ACE provides for projecting combat power in contested environments come with challenges for the command and control (C2) of dispersed forces in circumstances where communications are likely to be disrupted and airfields subject to persistent attack. ACE looks different in Europe and the Pacific. In Europe, it confronts what might be called the tyranny of proximity—short threat timelines against Russian missile launches or other attacks, and an expectation that any flight operations are readily observable. The Pacific presents the tyranny of distance—vast stretches of ocean between likely forward operating locations, with many of them in range of China's rapidly advancing missile capabilities. Each presents distinct C2 challenges.

As the DOD develops and fields C2 capabilities such as the advanced battle management system (ABMS) for joint all-domain operations (JADO)[2], what are the particular requirements that ACE will bring? What will ACE-oriented plans entail, and what information will decisionmakers require? Fundamentally, the idea of dispersed air operations from austere, forward operating locations is as old as the Air Force itself. Those early experiences demonstrated the complexities and risk tradeoffs associated with planning and synchronizing multifaceted dispersed operations in the presence of great uncertainty, providing insights that still resonate and can inform the evolution of ACE.

During World War II, the Eighth Air Force carried out extensive strategic bombing operations in western Europe, operating from numerous improvised and quickly built airfields scattered across eastern England.[3] Tactics evolved rapidly as allied forces conducted increasingly penetrating raids launched from these bases towards common targets in the German heartland. To concentrate bomb release while massing machine gun firepower for mutual protection, long range bombers used what came to be known as a *combat box* formation, so named because diagrams of the formation showed each squadron of aircraft filling a box-shaped volume in the air.[4] At a tactical level, well-defined procedures, radio beacons, and flares were used to establish the formation before proceeding as a cohesive unit of massed firepower. Individual aircraft would form up on their squadron first, and then the squadron commander would form on the group.[5] Getting a group of aircraft into formation could take an hour or more, costing fuel and added crew fatigue. Keeping close formation was integral to its effectiveness—the tighter the formation, the more effective the mutual defense.

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in command of nine B-17 groups who would strike ball bearing factories in Schweinfurt.[7] LeMay's force would go in first with the bulk of fighter escorts, while Williams' larger force would take off minutes later from separate airfields. The two sets of forces were to fly a similar course as if heading for the same target, and then split apart inside Germany. The intent was to confuse and disperse German air defenses. After striking aircraft production facilities in Regensburg, LeMay's force would proceed south to land in Algeria. Given the distances involved, the plan allowed only a 90-minute window to launch so that LeMay's force could reach North Africa in daylight.

When the day came to carry out the plan, heavy fog hung over eastern England. LeMay's force took off using well-honed instrument procedures, but Bomber Command headquarters held the Schweinfurt force (which was not practiced in such procedures) until the weather had cleared. Rather than dispersing defenses, the delay allowed the Luftwaffe to hit LeMay's force head on, and then regroup to attack the bombers headed to Schweinfurt.[8] A total of about 60 bombers out of 376 were lost—more than double the highest loss to that date. Another 100 were severely damaged and subsequently unusable. For those heavy losses, the results were modest and fleeting. The Schweinfurt raid caused an immediate significant drop in ball bearing production capacity, for which the Germans were able to compensate with reserve stocks. The attack against Regensburg aircraft production capabilities caused severe damage, but the Germans quickly rebuilt the factory and intensified efforts to disperse other fighter assembly plants in remote locations.

What might these historical examples tell us about how C2 capabilities and approaches should evolve to best enable ACE? Key lessons learned pertain to the complexity of synchronizing massed tactical actions from dispersed locations, and the challenges of developing robust, adaptable plans in the presence of uncertain and incomplete information. New Air Force doctrine[9] provides the foundation to address these challenges by framing *mission command* as the philosophy for C2 of airpower, implemented through centralized command, distributed control, and decentralized execution.

At the tactical level of decentralized execution, forces must have the information that enables them to understand the current and expected threat environment, the overall plan, their role within it, status of forces, available support relationships, and the means to be used for coordinating actions at the times and places required. Today there is no need for WWII-style combat boxes, but massing effects rather than just forces will call for aligning intent and actions across disparate and dispersed units in highly dynamic situations. Under the DOD's vision for JADO, those actions will span air, space, cyberspace, land, maritime, and special operations forces who will need to be in the right places at the right times to create complementary and mutually reinforcing effects. Information about friendly forces and threats may be incomplete, inaccurate, and potentially subject to adversary manipulation. As such, tactical level ACE playbook approaches and capabilities must enable dispersed forces to adapt and prevail *despite* uncertainty, using the best available information to local commanders. This will necessitate shifting the balance between offensive and defensive operations in response to what is achievable in light of available connectivity and logistical support.

At the operational level for centralized command and distributed control, the ability to understand what forces can achieve with available resources and to trade off risks become critical. Offensive/defensive capabilities and expertise available at each forward operating location may vary, as will available logistical support. The success of an overall plan may depend on aligning the actions of distributed forces, as was the case in the Regensburg-Schweinfurt raid. Decision support tools should thus illuminate the trade space in which a commander can successfully maneuver and adapt in changing circumstances. Plans must be resilient in the face of the unexpected, and the commander's intent conveyed to executing forces must provide the latitude needed to adapt to changing circumstances not foreseen beforehand. An intermittent or degraded ability for dispersed forces to communicate with higher headquarters should be the assumption, not the exception. This may drive the design of planning and collaboration tools to incorporate "offline modes" that provide partial functionality amid disrupted networking. The conditions under which a plan is no longer viable must be understood widely, so that dispersed forces can make appropriate local adjustments within the bounds of commander's intent. Planners must understand and incorporate the timelines that may be associated with bringing together dispersed forces into favorable positions for conducting successful attacks. Plans must be realistic for what can be accomplished against targets in contested environments where friendly force logistics may be the limiting factor.

Two elements are common to these needs—the ability to develop, maintain, and share timely, accurate, and relevant mission information across dispersed forces despite adversary attempts to deny or degrade it, and the ability to make and disseminate risk-informed decisions in conditions of imperfect knowledge. That information should provide dispersed commanders a shared understanding of what is happening across the theater, and what they can do to achieve the mission. Capabilities such as those under development for ABMS will be critical to providing the necessary awareness. Procedures, training, and effective delegation of authorities must enable Airmen to thrive amid the unexpected. The reconciliation of these seemingly contradictory needs—better situational understanding combined with the ability to take the initiative amid uncertainty—will be a critical enabler of how the Air Force realizes the ACE vision. Ongoing ACE events such as PACIFIC IRON will provide

venues for developing, evaluating, and refining materiel and non-materiel approaches that will give Airmen the edge in a crisis.

Notes

1 Pacific Air Forces Public Affairs Pacific Air Forces, "'Pacific Iron' to Showcase Us Air Force's Strategic Flexibility," U.S. Indo-Pacific Command, 13 July 2021, https://www.pacom.mil/.

2 Gen David Allvin, "How We Get to Captain America-Level Battle Speeds," Defense One, 8 July 2021, https://www.defenseone.com/.

3 Donald L. Miller, *Masters of the Air: America's Bomber Boys Who Fought the Air War Against Nazi Germany* (New York: Simon & Schuster, 2007).

4 "Combat Box," Wikipedia, 8 July 2021, https://en.wikipedia.org/.

5 Philip Kaplan, *Bombers: The Aircrew Experience* (London: Aurum Press, 2000).

6 "Schweinfurt–Regensburg mission," Wikipedia, 18 August 2021, https://en.wikipedia.org/.

7 Miller, *Masters of the Air*.

8 Malcolm Gladwell, *The Bomber Mafia: A Dream, a Temptation, and the Longest Night of the Second World War* (Little, Brown and Company, 2021).

9 Air Force Doctrine Publication 1, *The Air Force*, March 2021, https://www.doctrine.af.mil/.

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