

## AIR SUPERIORITY A Renewed Vision

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The rapid expansion of small unmanned aerial systems in the battlespace, as evidenced in Russia's war in Ukraine, upends our traditional definition of air superiority. In a near-peer conflict, adversaries' advanced systems would likely render untenable the US Air Force's unblemished 70-year record of air superiority against crewed threats. In response, America and its Allies and partners must adapt and innovate, culturally and in how we organize, train, and equip our forces and in how we plan, execute, and command and control operations. Necessary adaptations include dispersed operations of both forces and headquarters and a reconception of delegating risk and decision authority. A balanced mix of high- and low-end capabilities is achievable if we are innovative at both the system and organizational levels.

**A**pril 15, 1953. An unremarkable day in the news, but one with enduring significance for modern airpower practitioners. The date marks the last occasion when US forces suffered fatalities from a manned aerial attack—in this case a 1920s-era Polikarpov Po-2 on a nighttime harassment mission in the waning months of the Korean War. The watershed event quietly became the opening bookend of the US air superiority era, and although there has never been a guarantee of air superiority, the United States and its Allies have increasingly treated it as an article of faith ever since.

The US Air Force quite rightly takes great pride and inspiration in this 70-plus-year air superiority track record. But a wise airpower practitioner knows the relatively permissive air environment encountered over the last 30-plus years in Operations Inherent Resolve and Enduring Freedom is not indicative of current and future conflicts. Indeed, the rapid expansion of small unmanned aerial systems (sUAS) on display in Ukraine portends a complicated and deadly air-to-surface threat in any future war and challenges the utility of benchmarking the air superiority definition as defense against manned attacks. Furthermore, any conflict with a near-peer adversary will include both surface-to-air and air-to-air threats of such mass and capability that assuming our perfect 70-year track record of gaining and maintaining total air superiority would be irresponsible, if not dangerous.

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With this context in mind, a few questions remain: What event will provide the closing bookend to this exceptional era, how can the United States and its Allies ensure continued dominance in the air domain, and what should NATO nations do about this shifting paradigm?

To that end, I thank *Æther* for the opportunity to address these issues. Considering all the changes in the operational and strategic picture, we must take a holistic approach to create a renewed vision for the air domain. This short article will emphasize doctrinal, materiel, and information-sharing aspects as the lens through which we can both make sense of the new and emerging operational environment and think deliberately about what the broader Western airpower community can do to mitigate the associated risks and maximize our strategic potential. NATO nations can take powerful lessons from Ukraine, as exemplified by its development and use of the low-cost/high-yield Sky Fortress air defense program. We can also learn and implement capabilities and capacity from NATO's newest members: Finland and Sweden.

## **Air-Land Integration**

A major challenge NATO faces is increasingly congested and contested airspace, both by adversary threats and by the services' competing tactical priorities. Doctrine gives one mechanism to address this challenge. Battle management areas are already in US Joint doctrine, but there are still issues to be resolved during implementation that must be tailored to each situation. At a recent conference sponsored by the Joint Air Power Competence Centre (JAPCC) and hosted at NATO Air Command (AIRCOM), air-land integration was one of the primary topics. All participants gained a new understanding of the battle management area topic, and the Air-Land Integration syndicate identified follow-up areas for both AIRCOM and US Air Forces in Europe (USAFE) staffs.

Russia's war in Ukraine reaffirms that air superiority remains job number one. But we must be clear about our purpose. The air component does not simply pursue air superiority for its own sake. Air superiority is not just the first thing we work toward; it will typically remain our top priority—even if it becomes a low weight-of-effort later in the campaign—because it grants us freedom of maneuver to accomplish all other tasks and because attrition rates would otherwise become prohibitive. We have known this since the combined bomber offensive of World War II, and the current situation in Ukraine is a constant reminder of the terrible cost of a stalemate in the air.

Battle management areas are rightly intended to increase flexibility and independent action, but we must also ensure any changes do not impinge on the air component's freedom of action or negatively impact our support to the terrestrial domains. Just what are combined forces air component commander assets doing in the higher strata? A great proportion of those sorties are delivering close air support and battlefield air interdiction fires through the lower strata directly in support of the ground commander and Joint Force commander objectives.

This does not mean that the lower tier of the airspace is the US Air Force's by birthright, but rather that the principle of "ability to command and control" should be applied. Today's Airmen have always been and will remain keenly focused on the vertical dimension. The

72-hour targeting cycle, though it has room for improvement, is the mechanism by which the air component produces predictable and sustainable airpower from the entire Alliance. Ample flexibility remains to meet the ground commanders' needs with pre-allocated on-call close air support and interdiction missions, but we are likewise committed to finding innovative ways to improve the responsiveness of airpower.

I am encouraged that *Æther* is following up with this difficult topic in its next issue and encourage all participants to bring a multidomain operations perspective to the conversation. Toward that end, all participants in this debate need to find ways to think less from parochial service perspectives and more with an ecumenical lens to match the best asset to the desired effect across the entire battlespace. This is a daunting task and my challenge to all involved.

## Ukraine Lessons

There are abundant lessons from Russia's war in Ukraine, of which a few highlights are addressed here. For a more detailed assessment, please reference the recently published article in issue 37 of the *Journal of the JAPCC*, which summarizes the unclassified conclusions from our ongoing study of the war in Ukraine.<sup>1</sup>

### *Deterrence by Denial*

First, deterrence by denial depends upon having the right forces—equipped, trained, and proficient—that can win. In other words, when asking what force posture provides a credible deterrent, the answer is to be able to readily demonstrate that NATO possesses the forces it would take to forcibly deny the adversary their objectives. Authoritarian regimes are not likely to be constrained by public disapproval of military adventurism, so we must appeal to their rational interest that conflict with NATO is not worth the cost and risk to their national forces or regime.

### *Balanced Effort*

Second, we can derive many lessons from the relative stalemate in Ukraine. NATO nations cannot count on high-end capabilities alone to win the fight, as the proliferation of low-cost threats makes engagement with high-end weapon systems unsustainable. In addition to grossly underestimating Ukraine's political, military, and social resolve, Russia also expended the lion's share of its precision munitions in the early phases of the war to little effect, though it is reconstituting those munitions at pace. Without a campaign plan, robust targeting process, and sufficient electronic warfare resources, Russia initially squandered its precious stock of precision munitions, which it is now frantically trying to replenish.

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1. Joe Goodwin, "Allied Air Command Lessons from Ukraine: Implications from NATO Air & Space Power Conference," *Journal of the JAPCC* 37 (May 2024), <https://www.japcc.org/>.

## ***Mass and Scale***

Third, and an important distinction from the second, is the age-old principle of mass. In the industrial-scale warfare, any war between large combatants that is not decided in its early campaigns will devolve into an industrial war of attrition. Short, decisive campaigns such as the Gulf War are, in fact, the exception that proves the rule. Ukraine is the norm.

## ***Economics, Technology, and Society***

Fourth, the reality of industrial war leads to additional conclusions, namely, winning such a war depends on overall economic strength and resiliency, the ability to adapt and innovate, and the strength of political will and social cohesion. Our Alliance has tangible strengths in this area: A diverse and overlapping set of capabilities from various national defense industries is a strategic strength—as long as our Allies and partners have taken an integration-by-design approach from the beginning to achieve day-zero interoperability. In full-scale conflict, Alliance members would likely quickly overcome challenges, such as the glacial pace of procurement processes and policy roadblocks to interoperability and information sharing, especially if NATO were under attack. We must address those issues with the same vigor now to create the day-zero capabilities we need to deter and defend in the future.

## **A Strong Focus on Adaptability and Innovation**

### ***Sky Fortress***

Notwithstanding these general observations, Ukraine's adaptability and innovation deserve special attention. From the early days of the war, Ukraine has been highly innovative at adapting sUAS for anti-armor, antipersonnel, interdiction, reconnaissance, and artillery-spotting missions. Once Russia belatedly began competing in this space, Ukraine adapted again, developing the wildly imaginative Sky Fortress system—an acoustic passive-detection system that has proven highly effective at identifying incoming Russian aerial attacks, particularly drones.

Sky Fortress was the brainchild of a handful of Ukrainian scientists who mounted elevated microphones all around the country and connected them with cellular and radio networks. Using advanced computing to process the results, Sky Fortress quickly identifies and locates incoming attacks and triangulates their likely destinations and flight paths. This information is relayed to mobile firing groups (MFGs) equipped with truck-mounted machine guns and man-portable air defense systems (MANPADS). The MFGs then maneuver to the expected engagement point and use optical, thermal, and radar-guided tracking systems to complete the engagement. Ultimately, low-cost engagements of low-cost systems bring the fight back to the right side of the cost curve.

Notably, Sky Fortress also has exemplified many tasks most appropriate for machine learning and artificial intelligence (AI/ML). Ideal tasks for AI/ML are clearly defined, with large datasets upon which detailed analyses and correlation must take

place in near-real time. For such tasks, human judgment is generally not required until a decision must be made based on that data and analyses. We should continue to look for modest, rapidly attainable opportunities for automation that empower human decisionmakers and accelerate decision cycles.

### ***Exchange Cost and Sustainability***

Applying the lesson of Ukraine's adaptability and innovation to the challenges of maintaining the air superiority era puts a spotlight on NATO's approach to air defense. NATO air defense systems such as Patriot are highly effective, and Ukraine's ability to fuse so many systems into a coherent defense has been impressive, but when Ukraine utilizes a million-dollar missile to shoot down a Shahed drone that costs perhaps \$20,000, it ends up on the wrong side of sustainability, mass, and the cost curve.

Yet, this threat-versus-defender cost comparison only tells part of the story. Other factors must be considered: What is the value of the defended asset? If a high-end system is expended to defend a high-value defended asset, then perhaps the exchange was strategically worth the difference in cost: the value of the defended asset far exceeds the cost of the interceptor. Further, we must consider any secondary effects. Perhaps the high-end system is defending a nuclear power plant. Not only is that plant of great value—in terms of power production and replacement costs—but also the secondary effects of a radiological event would be catastrophic. From that perspective, expending the high-end system, even against low-cost threats, is an outright bargain.

This more accurate understanding on the cost of action versus inaction exemplifies the need for a balanced mix of high- and low-end capabilities. Such a high-low mix ensures we have the top capabilities to execute our most challenging missions while still affording the overall mass (both force structure and equipment) to cover all geographic responsibilities and provide enough depth to sustain ongoing operations and remain resilient to losses. Ukraine is leading the way with Sky Fortress. With its truck-mounted antiaircraft artillery systems, its MFGs accomplish most engagements with bullets for pennies on the dollar compared to the cost of the drone, not to mention the value of the defended asset.

## **A Stronger NATO**

The recent accession of Finland and Sweden to NATO punctuates another significant anniversary—75 years of the most successful defensive alliance in history. These two new Allies make our deterrence posture even more credible by securing the perimeter of the Baltic Sea region, expanding the Alliance's reach and expertise in the Arctic, and extending NATO's border with Russia by 1,300 kilometers. Inspired by Russian President Vladimir Putin's illegal war of aggression, the Alliance is reinvigorated and more robust than ever.

Operationally, our new Allies bring great proficiency in combined operations. The transparency and interoperability demonstrated by the Nordic Defense Cooperation are the example to which the rest of NATO should aspire. Additionally, both nations are world-class practitioners of dispersed operations. Agile combat employment (ACE) is a bit of a "back to the future" development for many in NATO—it was part of our plan-

ning and training during the Cold War, but we let that competency atrophy over the last 30 years. In contrast, our new Nordic Allies, necessitated by their former policies of non-alignment, sustained this capability.

Maintaining this combat edge is more than just practice. Sweden's Gripen, for example, can be combat turned for an air-to-air mission from a highway strip by a sergeant and a handful of conscripts in about 15 minutes. Practice is a big part, but it is only possible because of a host of conscious design decisions, capable Airmen trained to accomplish multiple tasks, judicious delegation of authority and risk, and a nonpunitive command culture. As US and NATO forces move boldly toward ACE operations, this is just one area among others where we can learn from our new Nordic Allies.

NATO brings together 32 nations with widely varied sizes, economies, and militaries, not to mention geopolitical challenges. Even still, NATO nations are united in our broadest values and steadfast commitment to collaborative defense. While the variation in available means can create some challenges to fielding a cohesive fighting force, the lessons and observations above lead to some exciting conclusions, such as the potential for specialization. As an example, it is not practical or even necessary for all NATO members to field a fifth-generation air force, nor do any of us have the resources to excel at everything. If, instead, nations specialize to deliver elements of the high-low mix, we can field a force with the depth and mass to credibly deter and, if necessary, defeat the diverse threats of near-peer adversaries.

Sky Fortress's relevance to NATO and our national processes could not be clearer. Of course, technological development is dynamic and unpredictable; the combatants and other nations will continue to adapt. The point is not that Ukraine's solution today will be 100 percent of our solution tomorrow or that other systems or companies could not be used for the same task. Rather, Sky Fortress simply exemplifies the importance of innovation, adaptability, procurement processes, cost, mass, interoperability, and more. Across the military, industry, and academia, the United States and its Ally and partner nations need to ask if they are aspiring toward the Ukraine model, or if they are complacent in traditional ways of doing business.

## **Conclusion**

USAFE and AIRCOM will continue to update the lessons learned from Ukraine, but the key points discussed herein are unlikely to change, as is the imperative for action. All Airmen have a key role in making sure NATO is a ready, resilient, and adaptable force. Through readiness and our defensive alliances, we will be an effective deterrent by being prepared to prevail. Æ

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