Allied Air Command Lessons from Ukraine: Implications from NATO Air & Space Power Conference

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The presence or absence of air superiority will continue to determine the entire character of conflicts; achieving air superiority requires much more than just fighters.

Introduction

The ongoing conflict between Russia (RUS) and Ukraine (UKR) has presented a unique opportunity for the Alliance to reflect on the experiences of both combatants and extract significant lessons for both the Air and Space domains. Whilst there has been extensive coverage of the conflict in the media, objective examination of the Air and Space Domain has been harder to come by. To inform the significant work within the Alliance aimed at addressing evolving European security dynamics, Allied Air Command hosted a conference in June 2023 supported by national think tanks, academic institutions, and defence academies – an audience of over 200 personnel with representation from across nations and components.

This article aims to offer initial assessments, consider implications for NATO Air and Space Power, and offer lessons that can be applied across the Alliance, the most notable of which is the failure of either RUS or UKR to achieve air superiority, and the consequent attritional land-focused conflict that followed. It will consider the effectiveness of RUS's Air and Space operational design, the consequences of the VKS's (RUS tactical air force) failure to embrace the requisite level of training/integration in the 20 years preceding the invasion, and offer an analysis of RUS resilience and a basis of assumptions for the future. It will review key tactical threats posed by RUS and the associated challenges for NATO to achieve the correct balance between 'exquisite', high-performance weapon systems versus the mass of cost-effective 'precise enough' munitions to counter near-peer adversaries. It will consider more universal, contemporary challenges, including the democratization of key technologies and the pervasiveness of the information space. Finally, it will examine the key tenants which have enabled UKR to survive and operate against what were almost universally considered to be unbeatable odds.

Air Superiority Remains Job #1

'Neither side was able to achieve sustained Air Superiority and if you don't have freedom of movement in the air, you don't have it in the land or maritime domains either.'[1]

Lack of air superiority has meant each side is reliant on their Integrated Air Defence Systems (IADS) for defence from air attack, with UKR more reliant than RUS due to Moscow's advantages in both the number and quality of their fixed-wing aircraft and long-range stand-off strike capabilities. RUS's failure to exploit these advantages should not obscure the credit which is due to UKR. The IADS with which UKR began the war was far denser, more extensive, connected, and coordinated than that protecting any comparably sized area of NATO territory, and this IADS has arguably only improved (despite massive expenditure of missiles) with the addition of modern Western Surface Based Air Defence Systems (SBADs), Anti Aircraft Artillery (AAA) and other systems.

Failure to achieve air superiority has forced both sides into fighting a prolonged land-focused attritional conflict. This is particularly noteworthy for the prolific use of artillery and the resulting mass destruction of civilian areas which would not be politically acceptable for the West. Had RUS been able to achieve air superiority at the start of the campaign, the situation UKR finds itself in today would have been markedly different.

Key Considerations:

- Contesting and denying the Air Domain remains priority #1 for the air component; it is crucial to enabling all defensive and offensive activities across the 'physical' domains.
- Counter-Anti-Access/Area Denial (A2/AD) and physical destruction (Destruction of Enemy Air Defences – DEAD), not just Suppression of Enemy Air Defences (SEAD), should be an essential focus for NATO multi-domain operations.
- In contested space, we will not have the unfettered air superiority we were accustomed to in Counter-Insurgency (COIN) operations. Adjusting our approach, with an ability to achieve localized and temporary air superiority to enable intermittent friendly air 'access' may be more realistic.
- Additional investments in a multi-layered, cost-effective Integrated Air and Missile Defence (IAMD) capability, able to match the most appropriate weapon to the target is crucial to securing an effective A2/AD capability across NATO territory.

Future Adversaries May Not Repeat RUS's Mistakes

'Although Allied intelligence overestimated RUS Air and Space operational design, the RUS systems which worried us before the conflict should still worry us today; RUS will reconstitute and apply hard earned lessons from this conflict'.[2]

RUS's Air and Space operational design, influenced by their intelligence failings which underestimated UKR capability, failed to effect the plan to seize control of Kyiv and UKR. The planned invasion included massive stand-off weapon strikes against Command and Control Air Defence (C2AD) targets, deep SF/VDV (RUS airborne troops) helicopter insertions to seize key terrain, and was expected to take three days. It was both a failure in concept and execution. RUS's reliance on pre-planned strikes failed to account for the inherent mobility of UKR's air defences, with battle damage assessment (BDA) and the targeting cycle being far too slow. The mistakes and delays on day one likely led to the failure of the operation – an example here being the key failure to capture and secure Hostomel Airport.

RUS squandered a crucial window of opportunity when UKR was unprepared and foreign backing for Kyiv largely non-existent. RUS airpower has continued to struggle to meaningfully influence the war beyond long-range strikes. The early but limited shift to provide close air support at some scale led to losses, with the RUS equivalent of strike and SEAD missions being largely ineffective. Early mistakes in the campaign have resulted in enduring costs. The eventual introduction of a more sophisticated air campaign was hindered by the squandering of large numbers of high-end systems against targets of dubious military value early in the war, and the subsequent reliance on less capable systems (such as the ageing and inaccurate AS-4 KITCHEN) to compensate for dwindling stockpiles of better weapons.

Key Considerations:

- Although NATO intelligence communities overestimated RUS capabilities before the war, underestimating them now could be dangerous too. NATO must continue to improve its equipment, training, and doctrine to deter and/or succeed in any potential future conflict with RUS.
- In an air campaign, windows of opportunity may be fleeting – there are rarely near-term second chances. The importance of speed (accuracy and timeliness) in everything, from developing situational awareness to informing decision-making, is clear. Evolving our air and space operational art/design, underpinned by agile AirC2 structures and the exploitation of emerging technology, is crucial to achieving this.

Quality 'vs' Quantity: is a Patriot Missile costing $ 1–2 million a cost-effective solution to counter a Shahed 136 (with an assessed cost comparable to a basics family car)? The cost of protection should never lose sight of the value of your adversary's target.

The Quality 'vs' Quantity Balance

'The only thing more expensive than a first-rate air force is a second-rate air force.'[3]

While RUS likely still maintains huge stockpiles of unguided munitions, the war has significantly depleted its arsenal of high-end munitions. This has meant a shift to using large numbers of cheap one-way attack (OWA) UAVs, notably the Iranian-supplied Shahed-136, to augment smaller numbers of highly effective air-launched and naval cruise missiles. The implication is that the cost of capable AD munitions could vastly exceed that of the attacking projectile. For example, the use of a PATRIOT missile costing $1–2 million to engage a Shahed-136 (with an assessed cost comparable to a basic family car) is financially disproportionate and unlikely to be sustainable, especially as OWA UAV technologies mature and become more widely proliferated. Of course, any cost calculation for AD must also include the (often huge) value of the protected asset, but it is clear nevertheless that future AD models will need to include cheaper solutions (such as AAA) in addition to expensive, high-end SBAD systems. Being in the right place on 'the cost curve' is vital.

UKR has demonstrated good judgement in terms of its munitions expenditure, focussing efforts on systems which give the highest return. NATO nations will need to be imaginative in their ways of employment to ensure effective mass is optimized. And munitions stockpiles matter too.

Key Considerations:

- Increasing the sophistication and coverage of our IAMD is essential; this should include a balanced array of AD options (including radar-guided AAA and cheap short range air defences (SHORAD) as well as advanced SBADs). This would, in turn, provide the best chance for employing an appropriate weapon system for each threat type; AAA, for example, is a better long-term choice for engaging a cheap OWA UAV than expensive, stockpile-limited SBAD.

Train how we plan to fight – testing and evolving integration with SHAPE, Theatre Components, and JFCs is crucial to achieving results greater than the sum of their parts.

- We must be willing to objectively evaluate the cost/benefit of 'exquisite' technology. Achieving the correct balance between 'exquisite', high-performance weapon systems versus the mass of cost-effective 'good enough' munitions needs continued objective analysis.
- Three decades of relative peace have encouraged 'lean processes'; however, national defence and security strategies that enable each nation to expand across all domains at pace are essential. We need to find the right balance between long-term procurement that affords the stability which encourages industrial investment and potential expansion, with short-term agility afforded by discretionary funding to enable opportunistic purchases. We must be willing to accept risk to perfection in favor of speed in a time of crisis.
- Compatibility must be prioritized by nations, for example, interoperability, standardization and some old skills such as Aircraft Cross Servicing (ACS). To achieve this, we must agree and set the standards for interoperability in order to exploit the principles of 'plug and play'. Procurement consortiums offer an opportunity to reduce costs whilst increasing interoperability and volume.

Train How We Plan to Fight

'The VKS's (RUS tactical air force) transformation of 2005–2022 focused upon getting good equipment, but lacked the requisite enterprise-level development and focus (e.g. on training/integration with land and maritime domains) needed to deliver genuine and robust high-end capabilities or military effectiveness.'[4]

Whilst RUS made skin-deep improvements to training processes in recent decades, during larger exercises there was no genuine enterprise-level focus and improvement across key lines of development in training and integration, central to which should have been joint warfare. Following the invasion, there was nothing

There is no sovereign territory in space and 'democratization' of the ultimate high ground presents both opportunity and jeopardy.

that resembled a coordinated air campaign until the strike campaign against UKR Critical National Infrastructure that started in October 2022. Even then, there was little evidence of the sustained focus and cross-domain planning that would indicate the existence of an orchestrated strategic plan. RUS's inability to package forces or exploit effects across domains has resulted in effects which are less than the sum of its parts.

Key Considerations:

- Test and evolve 'integration by design' with Supreme Headquarters Allied Powers Europe (SHAPE), Theatre Components, and Joint Force Commands (JFC) to inform the development of C2 in joint/multi-domain operations that exploit force packaging and flow and effects aggregation combining integrated (kinetic/non-kinetic) fires and effects.
- Development of practices that support the intent of mission-type orders and allow the de-centralized execution of complex missions with reduced or minimal connectivity must become habitual in order to enable agility whilst countering the temptation for micromanagement.

'Democratization' of Technology

'In the last century our imagination outstripped our technological capabilities in all domains. UKR has demonstrated the importance of innovation in bridging the gap to enable us to fully exploit the available technology which now risks outpacing our imagination'.[5]

The democratization of key technologies across the Air and Space Domains have made many traditionally state-controlled technologies available to all. Satellites can be put into space more cheaply and swiftly than ever thanks largely to the rise of commercial providers in the space industry, and so the increasingly contested Space Domain offers both challenge and

Mobile Patriot Battery – The 'UKR Air Force's ability to survive to operate has been largely down to its effective mobile IAMD and its passive defensive measures'.

opportunity. UKR's agility and innovative exploitation of commercially available and easily sourced technology has allowed it to achieve outcomes we would not have expected.

Key Considerations:

- Space is key to enabling our top priorities, including Counter-A2/AD (C-A2/AD) and IAMD. Defensive options as well as more offensive capabilities will be a priority in this increasingly contested domain.
- The opportunities from and threats to commercial providers in all domains needs to be fully analysed, understood, and then protected or taken advantage of accordingly.
- Agility and innovation are crucial to maintaining a competitive edge in an environment of unprecedented technological development and availability, noting that innovation does not equal or rest on 'exquisite' tech. The high volume/low tech 'good enough' model may be more appropriate, and there is a real premium on imagination.

'Offence' in the Information Space

'Maintaining competitiveness in the information space is crucial; the decisions to declassify key information allowed NATO to offer alternative, credible narratives.'[6]

The decision to declassify NATO Intelligence and release it as open source provided an opportunity to offer credible, alternative narratives, enabling Allies to counter RUS's established disinformation machine. However, speed and agility are crucial. UKR's integrated information operations design has highlighted the importance of playing 'offence' as well as 'defence' in the information space in order to dominate the narrative. Yet it is equally important to understand the totality of the audience. To Western commentators, UKR's dominance of the information space appears overwhelming, but analysis of the information environment and audiences in the Global South (for example) may tell a different story.

Key Considerations:

- NATO must continue to take the initiative and look for opportunities to advance and succeed with its narrative. Generating 'passive' reassurance at the military level, focussing on strength, unity, credibility, and deterrence, must be matched by 'offence' at the political level, calling out aggressive or malign behaviours.
- Consideration should be given to persistent influence operations well beyond NATO nations, focussing on countries which are neutral or have economic ties to RUS, by demonstrating the long-term economic and political benefits of aligning with the West.

We Must Re-prioritize Resilience

'The UKR Air Force's ability to survive and operate has been largely down to its effective, mobile IAMD and its passive defensive measures.'[7]

The resilience of the UKR Air Force has been underpinned by effective, mobile IAMD and passive air defences. UKR has practiced de facto Agile Combat Employment (ACE) for survival throughout the conflict and continued combat employment, to maintain a contested Air domain.

Key Considerations:

- Air denial is an effective strategy for the defender and we must establish our own credible A2/AD before any conflict to provide protection while we build forces to counter-attack and liberate any incursion into NATO. Resilience of such defences remains crucial.
- ACE is a key facet of resilience. Short to medium-term lines of development within the wider operational design of ACE should include dispersal, deception, hardening, and agility. All promote survivability and pose targeting/understanding problems for our adversaries.
- Resilience principles must be applied beyond tactical assets and apply equally to our AirC2 structures and logistic sustainment, crucial to which is protection of our people and our CIS systems.
- A 'whole of society' approach to the resilience and survivability of other critical capabilities including nations' industrial capacity, government functionality, banking and data systems, production, and logistics must be re-examined. All intersect with the Military Instrument of Power.

RUS Remains a Threat to NATO

'RUS in UKR today is not the same RUS as 18 months ago and it will not be the same RUS that NATO would face in a future conflict.'[8]

The current conflict has reaffirmed historic RUS tolerance for the significant attrition associated with artillery-heavy warfare. Putin's government is willing to weather levels of friendly losses and inflict indiscriminate violence on their adversary which would not be politically acceptable in the West. RUS resilience to economic levers is also worthy of note, from cloning brands to its mobilization of the population and elements of its economy. Militarily, RUS is driving efficiencies, focussing its efforts on fewer air platforms than before in order to enhance production, availability and training. RUS is now the junior partner to China and any ceasefire would likely see an increase in overt support from China to Russia. It is in China's interest to see the United States 'bogged down' and distracted in Europe. At the moment, RUS may consider that it has lost its ability to credibly threaten NATO conventionally, but may regain the capability to do so again in the next 3–5 years. Could RUS, in a future attempt, seize an otherwise unremarkable piece of land on its borders in a NATO country to test the Alliance's commitment to collective defence? Whilst at present RUS lacks the capability to threaten NATO conventionally as a whole, the 'will' remains, and the information effects of a small incursion that questions NATO's fortitude could have huge geopolitical implications if not effectively countered.

Key Consideration:

- Our air forces are not used to sustaining high losses; nor are our publics. We must re-set the paradigm for risk tolerance and rebalance the understanding of risk and reward in a peer-peer or near-peer fight.

Conclusion

Failure to achieve air superiority has led to a stalemate on the ground in UKR. The prolific use of artillery, and the resulting mass destruction of civilian areas, (which would be unacceptable for the West) has forced both sides into fighting a prolonged land-focused attritional conflict. Had RUS been able to achieve air superiority at the start of the campaign, the conflict would likely have been over very quickly. UKR has displayed an adept handling of a layered IADS that has leveraged mobile systems employed with great agility.

The addition of Western air defence systems to the UKR IADS has further enabled donor equipment to flow freely into the country without being targeted from the air. The evolution of RUS A2/AD capabilities creates a dilemma for the Alliance, and an effective counter to these capabilities is key to enabling NATO's defensive contingency plans. In addition to investment and training in effective C-A2/AD capabilities, Alliance nations must accelerate additional investment in IAMD and address this as a priority, along with sophisticated MDC2.

The RUS invasion of UKR has precipitated numerous unintended second-order effects, from the demonstration of NATO's resolve, unity, and expansion, to a shift in doctrinal focus away from COIN and back to peer/near-peer warfare. Whilst lessons from the Cold War offer a start point to reinstating the principles and practices of countering a conventional RUS threat, the UKR Crisis provides an unparalleled opportunity to examine the impact of changes to the technological and geopolitical landscape. The pervasiveness of the information space as well as accessibility and democratization of new technologies are central to this. NATO's ability to evolve from joint to multi-domain 'integration by design operations' will be critical and will necessitate enterprise-level integrated training combined with the exploitation of emerging technology.

Finally, the conflict continues to evolve at pace. These assessments are already being updated and tested as the cycle of learning and adaptation in wartime continues for both Ukraine and Russia. ●

1. General James B Hecker, COM AIRCOM, speaking at the Allied Air Command Lessons from Ukraine: Implications for NATO Air & Space Power Conference on 8 June 2023.
2. Sqn Ldr (Rtd) Rob Smith, Senior Analyst, AIRCOM A2, speaking at the Allied Air Command Lessons from Ukraine: Implications for NATO Air & Space Power Conference on 8 June 2023.
3. Professor Justin Bronk, Senior Research Fellow, RUSI, speaking at the Allied Air Command Lessons from Ukraine: Implications for NATO Air & Space Power Conference on 8 June 2023.
4. Ibid. 2.
5. Air Marshall J Stringer, DCOM AIRCOM, speaking at the Allied Air Command Lessons from Ukraine: Implications for NATO Air & Space Power Conference on 8 June 2023.
6. Ibid. 1.
7. Ibid. 2.
8. Ibid. 3.

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