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Technology without Doctrine is Not Transformation: Integrating UAS into Operational Art Ukraine

By: LTCOL Brendon Gledhill, Australian Army

SAG-U Operational Insights Team Email:
usarmy.wiesbaden.usareur.list.sag-u-lessons-learned-team@army.mil

Introduction

The effectiveness of military forces has historically depended not only on acquiring new technologies but on integrating them into coherent operational concepts. When innovation outpaces doctrinal development, tactical stagnation and missed opportunities often follow. Technological advancement alone does not guarantee battlefield success; it must be embedded within a framework that connects capability to tactical execution and operational effect.

Uncrewed Aerial Systems (UAS) now occupy a transformative position in modern warfare, akin to the use of the telegraph, artillery, and mechanised armour in previous era. Their capacity for surveillance, precision strike, and autonomous operation is well established. Yet their employment remains largely tactical, with operational potential underutilised. To realise this potential, UAS must be integrated into operational designs that emphasise disruption, tempo, and exploitation. When synchronised with ground manoeuvre and supported by electronic and information warfare, UAS can evolve from isolated enablers to instruments of systemic dislocation (Markham, 2024; Military Dispatches, 2024).

This paper explores six interconnected themes:

- Historical lessons in technological integration.
- The current tactical utility of UAS.
- UAS potential role in manoeuvre frameworks.
- The doctrinal gaps that limit UAS employment.
- Current operational constraints in drone-dense environments.
- Pathways for integrating UAS into operational art.

Together, these threads highlight the necessity of doctrinal reform to ensure UAS contribute meaningfully to operational manoeuvre and campaign success.

Historical Experience in Technological Integration

Military effectiveness has long hinged on the ability to adapt doctrine with emerging technologies. In the American Civil War, innovations like the railway and telegraph revolutionised logistics and communication, yet battlefield tactics remained rooted in Napoleonic-era methods resulting in prolonged engagements and unsustainable attrition (Watts, 1996).

The Russo-Japanese War (1904 - 1905) offered a more integrated approach. Japan’s coordination of modern artillery with infantry manoeuvre showcased the value of synchronised force application. Still, these lessons were slow to influence European military planning, revealing institutional resistance to doctrinal reform (Jackson, 2013).

A decisive shift occurred with the Soviet development of deep battle doctrine in the interwar period. Soviet planners moved beyond linear engagements, targeting

logistics, command nodes, and reserves to achieve disruption in depth. When paired with mechanised formations and tactical aviation, this approach enabled rapid advances and systemic dislocation of enemy forces. The key to success lay not in the technology itself, but in its deliberate integration into a coherent operational framework (Bousquet, 2017).

These historical examples demonstrate that without doctrinal alignment, even the most advanced capabilities risk remaining tactically useful but operationally inert. This lesson is directly relevant to the contemporary employment of UAS.

Tactical Utility to Operational Enablement

UAS have transitioned from niche assets to indispensable components of modern warfare. Their proliferation has reshaped tactical engagements by enabling persistence in real-time intelligence, precision targeting, and cost-effective strike capabilities. Yet despite their ubiquity, UAS remain largely confined to the tactical echelon, seldom employed as instruments of operational manoeuvre.

The invasion of Ukraine has showcased the evolution of UAS from initially locating artillery targets and interdicting logistics to novel applications such as aerial delivery of casualty evacuation equipment. These actions, while tactically effective, often lack integration with broader campaign objectives, resulting in fragmented force application that achieves localised effects but fails to generate systemic collapse or decisive breakthroughs (Oprean, 2023).

This reflects a doctrinal lag. Many militaries continue to treat UAS as tools of attrition or surveillance rather than enablers of manoeuvre. Unlocking their potential requires embedding them within operational designs for disruption, dislocation, and convergence across domains (Matlack, Schwartz & Gill, 2025).

From Attrition to Manoeuvre: Rethinking the Role of UAS

This paper does not advocate for redefining manoeuvre, but for integrating UAS into existing manoeuvre frameworks. UAS should be seen as capabilities that extend a commander’s toolkit, enabling effects across depth, tempo, and cohesion to create shock action. Operational shock occurs when an adversary’s ability to respond coherently collapses, command structures fragment, logistics falter, and initiative shifts decisively (Salinas, Askew & LeVay, 2025).

The future of warfare demands more than incremental adaptation but conceptual leaps. While UAS have demonstrated tactical utility, their potential remains underdeveloped in most militaries worldwide. To harness their capabilities, UAS operations must be embedded within a framework of operational art that prioritises tempo, depth, and systemic disruption.

UAS are uniquely suited to contribute to this kind of disruption which was once the realm of Attack Aviation, Armour and Long Range Fires. When synchronised, UAS alone can be the primary catalyst in creating cascading effects that paralyse enemy response mechanisms (Hijazi et al., 2019). Realising this potential requires a shift from reactive targeting to proactive shaping with UAS to fracture systems, not merely strike nodes.

The war in Ukraine has shown that the traditional combined arms team with armour, fires and attack aviation has been reshaped, often supplanted, by UAS, electronic warfare and AI-enabled targeting and C2. These capabilities now generate effects once delivered by larger, risk-prone platforms, shifting the balance of combat power toward digital reconnaissance, electromagnetic dominance, and accelerated decision-making. While the core concepts of manoeuvre remain valid, the methods for achieving tempo, protection, and shock have changed, creating a widening gap between enduring doctrine and the realities of drone-dense, algorithmically driven battlefields. This shift sees UAS, EW and AI as central and not auxiliary, elements of modern combined arms warfare.

This evolution calls for intellectual adaptation. Commanders must shift the question from what UAS can tactically observe and destroy to what can be operationally dislocated. How can they generate dilemmas, compress decision cycles, and force adversaries into reactive postures? The answers lie in doctrine, training, and imagination. When UAS are treated as agents of manoeuvre, they unlock a new level of operational agility and influence (Evans, 2023; Salinas, Askew, & LeVay, 2025).

Flipping the Script - Operational Constraints in Drone-Dense Environments

The rise of drone-saturated battlefields presents a challenge to conventional manoeuvre. Forces will find themselves increasingly constrained by persistent surveillance, loitering munitions, and autonomous targeting systems that saturate the tactical and operational depths. In these environments, manoeuvre built on speed, concentration, and surprise become harder to execute.

Units are forced to disperse to avoid detection, thereby slowing tempo and stretching C2 and logistics. The threat of precision strikes from small, inexpensive UAS increases vulnerability, especially for expensive bespoke armour, logistics and command elements. This leads to higher casualties and reduced freedom of movement, making it difficult to mass combat power at decisive points.

To operate effectively in such environments, a dramatic increase in counter-UAS capabilities is essential (not just in quantity, but in distribution). These systems must be pushed to the tactical levels, enabling sub-units to organically detect, disrupt, and neutralise drone threats. Centralised counter-UAS responses have proven slow and limited in coping with the speed and scale of modern drone warfare. NATO’s recent technical interoperability exercises have highlighted the need for decentralised, multi-

domain counter-UAS solutions that can respond at ‘time-zero’ across dispersed formations (NATO Emerging Security Challenges Division).

Without adaptation, manoeuvre risks becoming a vulnerable ideal that demands significantly more combat power to achieve due to the effect of UAS. NATO’s 2024 Counter-UAS (CUAS) Technical Interoperability Exercise (TIE24) showcased over 60 integrated systems and confirmed the need for decentralised, real-time countermeasures across dispersed formations. Further, NATO CUAS doctrine, shaped by battlefield lessons from Ukraine as well as multinational exercises (Exercise FLYTRAP), reflect a recognition that change is needed. Outcomes so far highlight that countermeasures must be just as agile, layered, and distributed as the threats they are designed to defeat.

Integrating UAS into the Operational Art

The proliferation of UAS marks a pivotal moment in the evolution of warfare. Yet despite their tactical success, UAS remain underleveraged at the operational level. Tactical victories, do not win campaigns. To truly reshape the battlespace, UAS must be integrated into manoeuvre-centric doctrine that prioritise dislocation and disruption.

Their agility and persistence position them uniquely to generate effects and accelerate tempo. However, this potential will remain unrealised unless militaries evolve thinking and institutional frameworks. Imagine a battlespace where UAS persistently sever supply lines, jam communications, and force adversaries into reactive postures. Where UAS operations are not isolated, but synchronised with ground manoeuvre, fires, and electronic warfare to produce layered, paralysing effects beyond tactical ranges. In this vision, UAS do not merely support manoeuvre, they shape and dictate it, reducing risk to personnel and crewed platforms of all types.

To realise this future, forces must invest in more than hardware. They must:

- **Reform Doctrine**: Update manoeuvre frameworks to explicitly incorporate UAS as integral components of operational design.
- **Plan at Campaign Level**: Embed UAS effects into joint targeting cycles and operational planning from the outset.
- **Educate Commanders**: Foster conceptual thinking around UAS employment, focusing on destabilisation rather than destruction.
- **Adapt Organisations**: Establish UAS specialists within headquarters to bridge gaps between operators, planners, and commanders.
- **Experiment and Iterate**: Use war gaming and simulation to test new concepts, feeding lessons learned directly into doctrine and capability development.

Strategic insight must guide capability development. Only through deliberate integration of UAS into operational design, training, and joint planning will they fulfil their potential, not merely as tools of future warfare, but as catalysts of its transformation

Conclusion

History demonstrates that technology without doctrine is not transformation. From the telegraph to mechanised armour, military forces have repeatedly shown that innovation alone does not guarantee success. UAS now stand at a similar crossroads.

About the Author:
Lieutenant Colonel Brendon Gledhill is an Australia Army Officer posted to NATO Security Assistance and Training for Ukraine (NSATU). He has significant experience in UAS and counter-UAS capability development.

References:

Bendett, S., & Kirichenko, D. (2025). *Battlefield drones and the accelerating autonomous arms race in Ukraine*. Modern War Institute. Modern War Institute article

Bousquet, A. (2017). *A revolution in military affairs? Changing technologies and changing practices of warfare*. In D. R. McCarthy (Ed.), *Technology and World Politics: An Introduction*. Routledge. A Revolution in Military Affairs

Evans, M. (2023). *The ADF and the operational art*. The Cove.

Hijazi, A., Ferguson, C. J., Ferraro, F. R., Hall, H., Hovee, M., & Wilcox, S. (2019). *Psychological dimensions of drone warfare*. *Current Psychology*, 38(5), 1285–1296. https://doi.org/10.1007/s12144-017-9684-7

Jackson, A. P. (2013). *The roots of military doctrine: Change and continuity in understanding the practice of warfare*. Combat Studies Institute Press. Army University Press

Kreps, S., & Lushenko, P. (2023). *Drones in modern war: Evolutionary, revolutionary, or both? Defense & Security Analysis*. https://doi.org/10.1080/14751798.2023.2178599

Markham, R. (2024). *Integrating drones isn't intuitive: Practical ways to build this critical capability*. Infantry Journal, Fall 2024. lineofdeparture.army.mil

Matlack, J.-W., Schwartz, S., & Gill, O. (2025). *Ukraine's drone ecosystem and the defence of Europe: Lessons lost can't be learned*. LSE IDEAS. LSE Research Report

Microsoft Copilot. (2025). Assistance with editorial suggestions and reference integration. Microsoft. https://copilot.microsoft.com

Military Dispatches Editorial. (2024). *Integrating doctrine and technology for military advancement*. Retrieved from militarydispatches.com

Molloy, O. (2024). *Drones in modern warfare: Lessons learnt from the war in Ukraine*. Australian Army Occasional Paper No. 29. Australian Army Research Centre

Oprean, L.-G. (2023). *Artillery and drone action issues in the war in Ukraine*. Scientific Bulletin, 28(1), 1–15. ResearchGate

NATO Emerging Security Challenges Division. (2022). *Countering Class I Unmanned Aircraft Systems (C-UAS) Handbook*. https://www.nato.int/nato_static_fl2014/assets/pdf/2022/8/pdf/220803-flyer-C-UAS-EN.pdf

Salinas, A., Askew, M., & LeVay, J. P. (2025). *From tactical trench killers to strategic war winners: Doctrine, operational art, and tomorrow's drone-enabled maneuver warfare*. Modern War Institute. Retrieved from Modern War Institute article

Watts, B. D. (1996). *Doctrine, technology, and war*. Air & Space Doctrinal Symposium. Air University