

What can the ADF learn from Ukraine's air defences?

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When Russia invaded Ukraine in February 2022, few expected Ukraine could defend itself against the Russian air and missile threat. Yet more than three years later, Ukraine continues to deny Russia air superiority, growing and adapting its defences against a continually evolving Russian threat.

Unlike Ukraine, Australia doesn't face the risk of invasion, but our region bristles with advanced missile systems. The 2024 National Defence Strategy and 2023 Defence Strategic Review both prioritised Integrated Air and Missile Defence (IAMD) (Department of Defence, 2023; 2024). The Australian Defence Force (ADF) should therefore make every effort to learn from Ukraine's real-world air defence experience. Doing so requires an understanding of the conflict, and an analysis of Australia and Ukraine's strategic contexts to determine applicable and transferrable insights.

A more thorough analysis of this topic will shortly be published in the Contemporary Issues in Air and Space Power journal ([Simmill, 2025](#)).

How Ukraine Defended its Skies

When Russia invaded Ukraine in February 2022, Ukraine boasted an extensive, prepared air defence system. In reaction to Russia's seizure of Crimea in 2014, the Ukrainian Air Force had improved training, repaired critical equipment, integrated new capabilities ([Kuzmuk & Scarazzato, 2025](#)) and started sharing intelligence with Western allies ([Mills, 2022](#)). These improvements meant that in early 2022, Ukraine fielded an integrated system of command and control centres, early warning radars, long- and medium-range surface-to-air missiles (SAM), and man-portable air defence systems and anti-aircraft artillery ([Bronk, Reynolds, & Watling, 2022](#); [Sankaran, 2024](#)).

Russia attempted to destroy this air defence system as part of its initial invasion of Ukraine. A wave of air and missile strikes targeted radars, airbases and SAM sites. But poor Russian planning, inadequate targeting, and dispersal of Ukrainian mobile systems meant that most survived ([Zabrotskyi, Watling, Danylyuk, & Reynolds, 2022](#)). Within days, Ukraine had restored a basic air defence capability, and quickly imposed steep costs on Russian aircraft operating over Ukraine ([Sankaran, 2024](#)). A state of mutual air denial was soon established – neither side could fly crewed aircraft over the battlefield without putting them at grave danger.

Adapt to Survive

Russia responded to Ukraine's resilience by changing tactics and targets. With Ukrainian airspace too dangerous for crewed aircraft, they switched to missile and drone attacks. Coordinated strikes integrated multitudes of drones with cruise and ballistic missiles to overwhelm defences and hit key targets ([Bronk, Reynolds & Watling, 2022](#)). As Russian hopes of quick victory faded, they also began targeting civilians and civilian infrastructure ([Harmash, 2023](#)).

Ukraine was forced to constantly innovate and adapt. They developed more efficient methods for defeating drones ([Watling & Reynolds](#), 2025), embraced commercially available communications and networking technologies ([Bondar](#), 2025), and incorporated donated Western air defence capabilities into a single integrated system ([Di Mizio & Gjerstad](#), 2025). They also changed their defensive posture to protect civilian infrastructure, and worked closely with civil authorities and emergency responders ([Malyasov](#), 2025).

The most dramatic shift came in late 2024 when Ukraine began striking airfields, missile depots, and oil refineries inside Russia ([Reuters](#), 2025). They then conducted drone strikes on Russian air bases thousands of miles from the Ukrainian border ([Ryan](#), 2025). Ukraine had assumed a more offensive approach to its air defence strategy – striking Russian threats before they could launch.

These adaptations helped counteract the Russian threat. But Ukraine remains heavily dependent on Western aid for the provision of air defence munitions, and some Russian missiles still penetrate defences and hit their targets.

Australia's different but similar challenge

The ADF can learn from Ukraine's resilience, adaptation, and system employment. To identify appropriate insights, we need to understand the similarities and differences between Australia and Ukraine's strategic environments and threats.

Australia's geography protects us from the threat of a land invasion, but not from coercion. Like Ukraine, our region includes nations willing to coerce other countries and challenge the existing rules-based order (Department of Defence, 2023). Some of these nations field advanced missile capabilities that can threaten Australia.

These capabilities are similar to those faced by Ukraine – long-range cruise and ballistic missiles with precision targeting ([US Army Training and Doctrine Command](#), 2025). And like Ukraine, Australia should be prepared for an adversary to target civilian infrastructure. While the missile threat is therefore comparable, Australia's geography makes the use of short-range, disposable drones, incorporated into massive attacks in Ukraine, far less of a threat ([Hollenbeck et al.](#), 2025).

Five Insights for the ADF

With these similarities and differences in mind, we can identify five insights applicable to the ADF's IAMD system.

1. Manufacture air defence munitions locally

In any regional conflict, Australia cannot rely on allies to replenish our air defence missile stocks. We must establish suitable war stocks, and the ability to produce our own air defence munitions.

2. Integrate and adapt faster

Ukraine has shown the force-multiplying effect of quickly identifying and integrating new capabilities, including commercial off-the-shelf technology. We need processes that replicate this type of adaptability.

3. Defend civilian infrastructure

The 2024 National Defence Strategy directs the ADF to defend Defence infrastructure and facilities. The Ukraine-Russia conflict has shown this is not enough. The ADF's IAMD system must be able to defend people and civilian infrastructure, not just bases.

4. Prepare for missiles that get through

Just as Ukraine's defences can't stop every missile, the Australian Government and ADF must plan for strikes that get through our defences. Emergency responses, civil defence, and national resilience measures must all be integrated into IAMD planning.

5. Go on the offensive

To complement a defensive IAMD system, the ADF requires a strike capability that can target launch platforms, warships, air bases and supporting facilities. This would contribute to deterrence, and decrease the missile threat to Australia.

Conclusion

Australia's deteriorating strategic environment means we must be ready to counter advanced air and missile threats. The war in Ukraine provides a real experience of defending against such threats, and applicable insights are clear.

We need domestic munitions production, more agile and responsive integration processes, and the ability to defend both military and civilian assets. We need to prepare for missiles that defeat our defences, and a strike capability that deters adversaries. These insights could significantly improve the ADF's ability to defend Australia, should the need arise.

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