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Cover image: Australian Army soldiers from the 1st Battalion, The Royal Australian Regiment, board a CH-47 helicopter on board HMAS Adelaide during Exercise Sea Explorer 2022. (Source: Defence Image Gallery)

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Abstract

In 2021–2022, the 1st Battalion, Royal Australian Regiment (1 RAR), experimented to develop a 'disrupt force' consisting of light infantry augmented with uncrewed aerial systems and ground vehicles. This group operated ahead of other forces to report on the opposing force, but also ambushed enemy reinforcement and withdrawal routes. The disrupt force actively attacked and degraded opposing forces and their plans, isolating objectives and setting the conditions for friendly combat teams to conduct decisive manoeuvre. The aims of this experiment were twofold: to provide feedback on individual platforms and to examine the combination of technologies in a combat system. This work examined Defence science and technology concepts for employment of infantry, and offered insight into how infantry might fight and survive in the Indo-Pacific on a battlefield where uncrewed systems have proliferated.

The disrupt force successfully disrupted opposing capabilities and increased the tempo at which the battlegroup could approach and seize objectives.[1] The force neutralised key enemy capabilities using relatively cheap means and took comparatively few casualties. Thus, it offered a disproportionate effect compared to the resources expended to deploy the force. This result is consistent with work conducted by the United States Army and British Army, where literature is converging on ideas around widely dispersed infantry augmented by uncrewed platforms.

The exercises indicate that tactics like those used by the disrupt force, with their enabling technology, could offer an asymmetric advantage to the Australian Defence Force (ADF) and warrant further development. Along the way, experiments faced cultural and organisational challenges and required an iterative process. Still, the experience demonstrated that battlegroups should continue the development of the disrupt force, that the ADF should better enable training with uncrewed aerial systems, including in large numbers, and that there would be great value in supporting experimenting teams to collaborate and share lessons learned.

This paper presents a review of relevant historical tactics coupled with recent technological changes and describes two years of experiments in the field. It concludes with recommendations for the ongoing development of tactics and experiments in Army.

'What does it mean to be light infantry? It means you are a hunter.'

William S Lind, *4th Generation Warfare Handbook*[2]

Introduction

The 2023 Defence Strategic Review (DSR) by Air Chief Marshal Sir Angus Houston and Professor Stephen Smith called for capabilities that generate asymmetric advantage, which target an enemy's weaknesses and impose a disproportional cost on them, perhaps in a non-traditional manner.[3] Following the DSR, the Chief of Defence Force and the Secretary of the Department of Defence asked the department to 'identify and hone … ideas that will add weight and momentum to our shared development of an integrated, focused force'.[4] To that end, this paper describes experiments over 2021–2022 with a 'disrupt force' consisting mainly of infantry supported by uncrewed systems, developing tactics suitable for near-future battles. Despite preceding the DSR's directive, the tactics explored during the experimentation demonstrated the potential to provide the 'disproportionate effects' the Australian Defence Force (ADF) requires under the DSR.

There is little recent literature on experimentation in the Australian Army, especially in combat units.[5] Yet changes to the Army's structure in 2023 elevated the 1st Armoured Regiment to a dedicated experimental unit.[6] While much has been written about Australia's strategic context, this paper takes a different approach by focusing on the tactical level, exploring force structures and tactics suited for the next war. It examines the development of tactics in an Australian context and the experiences of soldiers and officers involved. Quantitative comparisons, or claims that some tactics or platforms are universally superior to others, are deliberately avoided as no data currently exists in Army to support such conclusions. A statistical comparison would need to account for variables such as commanders, soldiers, platforms, terrain and scenarios, and Army does not collect this kind of data. Instead, this work provides a military practitioner's perspective to inform the discussion of 21st-century infantry tactics, using a descriptive and qualitative approach based on observations in the field.

The 1st Battalion, Royal Australian Regiment (1 RAR), experimented with technology and tactics in a light infantry disrupt force. The force's role was to conduct ambushes, undertake reconnaissance and secure approaches to objectives behind the opposing force. The structure and employment of the disrupt force differed from that of other similar-sized elements. With between 90 and 140 personnel, the disrupt force formed a combat team—a combined arms grouping based on a sub-unit headquarters commanded by a major.[7] Combat teams often comprise one to two capabilities, such as two infantry platoons and an armoured troop, with some more minor additions. These more traditional combat teams provide combat power and mass. They are suitable for attacking objectives, defending terrain, and forcing an immediate outcome on the battlefield. However, the tactics used in the experiments consisted of more diverse capabilities in smaller detachments. Teams focused on gaining situational awareness were combined with those designed to strike the opposing force directly. The disrupt force operated to understand the 'enemy', degrade their capabilities and disrupt their plans over days rather than in a concentrated action. While the disrupt force was adept at disrupting opposing forces and setting the conditions for decisive manoeuvre, these exercises indicated that it was less suitable for seizing or holding any specific terrain. In addition, forming a disrupt force reduced the assets available for other combat teams. This situation compelled the battlegroup to take risks elsewhere and required the disrupt force to set conditions for the other combat teams' success.

In force-on-force exercises, the disrupt force placed pressure on the opposing elements and increased the operational tempo of friendly combat teams and the battlegroup. A battlegroup is a combined arms grouping commanded by a lieutenant colonel and based on an arms corps headquarters. The disrupt force supported Battlegroup Coral, based on 1 RAR, and at times Battlegroup Eagle—an armoured battlegroup based on the 2nd Cavalry Regiment. Crucially, the disrupt force employed uncrewed aerial and ground systems to increase its endurance, tempo and lethality. Rather than seeking to fill a known gap in capability, the disrupt force took an exploratory approach to examine how army tactics could be improved, inspired by several concepts outlined in the literature review.

As the exercises progressed and the problem was better defined, it became clear that the lessons learned might shed light on how infantry could

fight and survive in the Indo-Pacific as uncrewed systems become more widespread. Interactions with aviation, artillery and armour could also inform those corps of tactical options in cooperation with infantry. This gradual approach to defining the problem may seem disorganised. However, authors MacGregor Knox and Williamson Murray point out in their excellent work on military revolution that 'innovation and adaptation are messy … Yet in the end, battlefield outcomes usually make pitilessly clear which military organisation has innovated most effectively'.[8] Early challenges in defining the intended opportunities and outcomes were insufficient cause to forgo opportunities for improvement.

The disrupt force held expensive land assets at risk at the tactical level of war. The investment required to generate the force, however, was shown to be justified. The disrupt force's performance in the field demonstrated that if a small force element can destroy an armoured vehicle, crew and passengers using artillery, anti-armour weapons or uncrewed systems, that team has more than paid for itself. This experience on exercise in Australia is consistent with findings from Dr Oleksandra Molloy's study of lessons learned from the war in Ukraine that:

> UAS [uncrewed aerial systems] serve as an asymmetric response to the adversary's cost imposition strategy' and that 'robotic and autonomous systems have been shown to be effective at providing lethality at range, at low cost, and with economy of effort.[9]

It is also consistent with the experience of Australian UAS operators in Ukraine.[10] Logistics assets such as fuel trucks or command and control nodes are critical yet can be disrupted by small teams with the right resources. It would be reductive to claim infantry's superiority over other elements—even if augmented by uncrewed systems. On the contrary, integration with other elements was critical. Ultimately the exercises showed that it is possible for a disrupt force to destroy more value than it costs to generate, thus delivering a disproportionate effect. This finding can inform battlegroup commanding officers and planners on how to continue developing tactics that offer a disproportionate effect without requiring a fundamental reorganisation of Army.

This paper will examine Western thought on infantry tactics and trends in uncrewed systems in recent conflicts. It will then outline the experiments conducted by 1 RAR, summarise tactical observations, describe friction

points, and offer recommendations. Challenging exercises demonstrated that, augmented by robotic and autonomous systems, disaggregated light infantry can frustrate enemy plans and attrit enemy assets. This effect can be achieved by existing infantry, enhanced by uncrewed systems. This realisation should prompt the Army to develop and invest in these tactics. However, before proceeding, it is worth addressing two frequently asked questions: how these tactics differ from standard practice, and how infantry use of them differs from that of special operations forces (SOF).

Contrasts with Common Tactics

The concept for the disrupt force was to operate well ahead of the battlegroup to disrupt the enemy's planning and set the conditions for decisive manoeuvre by other elements. 'Decisive manoeuvre' was understood to be the action taken to achieve the higher echelon's mission. It goes beyond shaping actions and aims to defeat the enemy locally. In army terminology, it would often achieve a 'decisive event'. For example, if the battlegroup needed to clear an objective of the enemy, the disrupt force would set the conditions to allow a different combat team to assault that objective.

These were not typical 'screen' or 'guard' actions. In Australian doctrine, a screen is 'a form of security operation that provides early warning to the protected force'.[11] While the disrupt force often provided this effect, it also inflicted significant attrition on opposing assets. Meanwhile, a guard is 'a form of security operation whose primary task is to protect the main body while fighting to gain time, while also observing and reporting information and preventing enemy ground observation'.[12] While this definition is closer to the model used in 1 RAR's experiments, the disrupt force usually operated behind and to the flank of opposing forces rather than placing itself between opposing combat teams and the friendly main body. A guard also contains sufficient fighting power to decisively engage the enemy, which the disrupt force typically lacked.[13] The closest tactical task is to 'disrupt', integrating 'direct and indirect fires, terrain and obstacles to upset an enemy's formation or tempo'.[14] Importantly though, given the use of an adjusted force structure and the focus on setting conditions for decisive manoeuvre, the experiments were broader than simply giving a task to screen, guard or disrupt.

Contrasts with Special Operations Forces

The disrupt force's tactics and intent did not seek to replicate SOF or represent an 'SAS lite'. The two forces differ in recruitment, training and employment. Australian Special Forces are specially selected, while these experiments used general-purpose infantry.[15] Good infantry tactics achieve tactical and operational outcomes by winning battles, whereas Special Forces are a 'national mission force' needed at the strategic level of war.[16] Australian authors James Easton and Joshua Kolo posit that the utility of SOF in strategic competition comes from sustained campaigning, not decisive tactical actions.[17] Thus, infantry tactics must provide commanders with options that do not rely on the efforts of Special Operations Command. Finally, SOF cannot be everywhere; nor are they required everywhere. Major General Andrew Hocking noted lessons from the Afghanistan campaign highlighting that a 'false perception' may have existed that infantry 'were not as well trained and/or presented a higher casualty risk' than Special Forces.[18] SOF do not have a monopoly on good tactics. If infantry can conduct a mission, they should do so and allow SOF to focus on tasks only they can perform. This is consistent with 'economy of effort' as a principle of war.[19]

Literature Review

Relevance of Close Combat and Tactics to Strategic Direction

The DSR and the resulting 2024 National Defence Strategy, which both emphasised guided weapons and changes to force structure, might not appear to prioritise close combat capabilities. However, the DSR calls for a 'fully enabled, integrated amphibious-capable combined arms system'.[20] As this paper describes, much experimentation occurred during amphibious exercises. The DSR recommends a strategy of denial using area denial systems.[21] This paper proposes that a disrupt force supports area denial systems in the Indo-Pacific by finding and disrupting the enemy on land who seek to target them.

In 2023, Australian academics Dr Andrew Carr and Professor Stephan Frühling examined Australia's options for positioning forces in the Indo-Pacific region for 'forward presence', proposing deploying formed units or sub-units beyond domestic areas.[22] One of the scenarios envisioned during 1 RAR's experiments was infantry teams cueing strike assets to destroy targets in the littoral environment, reminiscent of the Coastwatchers of World War II. While Carr and Frühling's work does not focus on infantry, they note Australian discussion of the value of 'highly dispersed small combat groups' able to call upon fires, drawing a similar comparison to the Coastwatchers.[23] Though the Coastwatchers concept focuses more on surveillance than the disrupt force, it provides a relevant example of infantry teams calling on other assets.

The National Defence Strategy highlights the need to ensure 'Army can secure and control strategic land positions'.[24] Infantry is essential to seizing and holding ground, including the objectives that the integrated force will fight for.[25] Australian researcher Dr Albert Palazzo describes light infantry as having a 'key role' within the force described in the DSR and provides the example of infantry supporting the deployment of missile batteries.[26] Similarly, Carr and Frühling argue that 'taking and holding territory remains crucial' even when employing a policy of deterrence.[27] Guided weapons and anti-access systems cannot replace the decisive result that infantry provides on the battlefield. In fact, infantry will be essential to deploy those systems.

It has been put to the author that if Australian infantry engages in close combat, the strategy of deterrence by denial has failed. However, the Chief of Army, Lieutenant General Simon Stuart, noted the dangerous allure of this line of thinking in his speech to Land Forces 2024, warning against the false promise of technology 'to make political violence remote, risk-free, quick and clean'.[28] Australia's combat elements should be proficient and lethal rather than assuming that close combat will not be necessary, or that Australia can choose not to engage in it. As von Clausewitz wrote of the enemy, 'he dictates to me as much as I dictate to him'.[29]

Employment of Dispersed Infantry with Disruptive Effects

Infantry has a long history of operating in dispersed teams to disrupt enemy plans. In World War II, the German Army employed 'infiltration tactics', influencing land warfare discussion into the 1920s. British Army officer turned author Jim Storr summarises infiltration tactics as 'to find and attack weak spots, typically the enemy's flanks and rear, on the immediate battlefield'[30] with the aim to 'confuse and distract enemy commanders with a complex, dynamic situation'.[31] This theme of disrupting enemy decision-making continues in the development of infantry tactics.

In World War II, Field Marshall William Slim, commander of the Allied Fourteenth Army in the Burma Campaign, recorded the use of the 'roadblock' by both Japanese and Commonwealth infantries. These teams established ambushes and defensive positions behind enemy lines, disrupting resupply and withdrawal routes.[32] From infiltration tactics to the roadblock, infantry have a long history of working their way behind the enemy.

American authors William S Lind and Gregory A Thiele's 2015 work on the employment of light infantry influenced the disrupt force's experiments. Lind and Thiele argued that light infantry should be comfortable when surrounded, operate for long periods without resupply, and employ an ambush mentality.[33] Such units should 'attack by infiltration and defend by ambush', avoiding the enemy's strengths and targeting places and moments where they are weak and unprepared.[34] The authors describe light infantry as 'hunters on the battlefield'.[35] While this conceptualisation may seem simplistic, it resonated with soldiers involved in the disrupt force concept and it generated and sustained an ethos that energised the experiments.

Recent research explores how light infantry tactics might be enabled by technology. Many concepts use infantry in widely dispersed teams supported by uncrewed systems. For example, in 2018, United States Army officer Zachary L Morris proposed the 'Light Infantry Robotic Company', where uncrewed ground vehicles would carry the company's heaviest weapons.[36] The force would also employ uncrewed aerial systems with anti-personnel and anti-tank capabilities.[37] While acknowledging the challenges in command and control of robotic systems, Morris argues that the concept would enhance lethality and situational understanding.[38] Morris's proposed structure, which includes specialist infantry such as mortars and anti-armour teams, influenced 1 RAR's experiments.[39]

In 2019, American academic Professor Benjamin Jensen and military research project manager John Paschkewitz proposed 'mosaic warfare', where infantry are supported by small, flexible systems like loitering munitions.[40] These weapons can fly or 'loiter' around a location, attacking once the target is located.[41] Teams in mosaic warfare can disperse as needed, concentrating their combat power at the commander's discretion. In wargames, these elements destroyed expensive land platforms and won a combined arms fight; this resulted in calls for further experiments in the field by units. Their work continues the evolution of infantry augmented by uncrewed systems.

Australia's Defence Science and Technology Group contributed to the discussion with two concepts published in 2020: the 'semi-autonomous combat team' and the 'skirmishing mist'. Both concepts paired infantry with uncrewed systems but with differences in the concentration and specialisation of teams. Both influenced 1 RAR's experiments in 2021 and 2022. First, the 'semi-autonomous combat team' concept authored by Dr Matthew Sawers and Kim Tang describes an infantry combat team augmented by uncrewed systems ranging from ground vehicles to sensors and tiny robots.[42] Ideally these systems possess some autonomy but are directed through a 'combat cloud'—a secure wireless network.[43] Sensors providing situational awareness include thermal, acoustic and radar.[44] The semi-autonomous combat team concept retains a traditional structure with three platoons comprising three sections but prioritises robotic systems in close combat. A workshop conducted by the authors with infantry officers and non-commissioned officers, as well as technology experts, concluded that this structure offered enhanced situational awareness, and achieved both greater lethality and strike distance.[45]

In contrast, the skirmishing mist concept developed by Nicholas Kempt visualised uncrewed systems with small specialised teams, including command, reconnaissance, cyber-electromagnetic, pioneer, strike, and support functions.[46] Rather than being grouped in threes, 25 teams of 20 soldiers report to a single headquarters. Therefore, the skirmishing mist fights unlike a current combat team or battlegroup. Teams rarely manoeuvre together but are allocated an area in which to find and disrupt the enemy.[47] The teams are inserted into the battlefield using helicopters, landing craft or small boats and then move to their area of responsibility.[48] Despite the addition of uncrewed systems, this scheme of manoeuvre is consistent with Lind and Thiele's recommendations for light infantry to be allocated areas under junior commanders.[49] Therefore, regardless of technology, dispersion remains a strong theme in tactical concepts.

Within the skirmishing mist, reconnaissance cells 'tag' targets for a strike by other assets. Meanwhile the only teams intended to engage in close combat are the 'strike cells', using uncrewed systems wherever possible.[50] Through demolitions and obstacles, pioneer cells limit the enemy's mobility, and cyber-electromagnetic teams disrupt enemy communications. This concept utilises a combined arms approach with access to artillery, long-range fires or uncrewed combat air vehicles to destroy targets. Crucially, the skirmishing mist sets the conditions for decisive manoeuvre by a much heavier element, such as an armoured regiment.[51] As the authors summarise, 'the concept is not the grand sole solution to everything', but this theme of dispersed infantry setting the conditions for decisive manoeuvre carried forward into 1 RAR's experiments.[52]

In 2022, elements of the British Army developed an Intelligence, Surveillance, Target Acquisition and Reconnaissance Group. This combination of specialist infantry teams with crewed and uncrewed systems was effective in force-on-force exercises.[53] The fact that another Western army has independently developed similar tactics to those of the disrupt force suggests the existence of a converging evolution of fighting infantry supported by uncrewed systems.

Employment of Uncrewed Systems

Uncrewed systems now receive significant attention in reporting and discourse on war, but the basic technology has been available for decades. In 1991, the United States, Britain, France and Iraq deployed uncrewed aerial systems in battle.[54] In 1992, Wing Commander Gary Waters, a Royal Australian Air Force officer, published his study of the Gulf War.[55] He noted uncrewed aerial systems' potential for tactical reconnaissance and their relative cheapness.[56] In 1999, China acquired the highly capable Harpy loitering munition.[57] The Global War on Terror then saw Australia's key ally, the United States, increase its use of uncrewed systems. The Shadow uncrewed aerial system was introduced into service with the United States Army in 2004, and the Switchblade loitering munition in 2012. It is notable that neither system was regarded as a boutique capability for SOF; rather they were intended for the general-purpose force.[58] Uncrewed systems have been used in battle since before some of today's soldiers were born. Thus, their employment is neither new nor radical.

In 2014, the Russians used uncrewed aerial systems to call for artillery fire in Ukraine.[59] This prompted observers in 2015 to warn of increasing employment of such systems in future conflicts.[60] They were then used extensively in the Nagorno-Karabakh War and the current conflict in Ukraine.[61] In outlining preliminary lessons from Ukraine, authors led by Lieutenant General Mykhaylo Zabrodskyi warned that '[uncrewed aerial systems] … must be available across all branches and echelons'.[62]

Some authors are more critical of uncrewed systems. Examining data from the Nagorno-Karabakh War, Israeli defence analyst Dr Eado Hecht argues that perceptions of their effectiveness are skewed by only successful missions being publicised. Hecht concludes that uncrewed aerial systems were necessary but not sufficient for Azerbaijan's battlefield success and that their effects had been overstated.[63] Researchers Dr Antonio Calcara et al. point to heavy equipment casualties among uncrewed systems and see them as part of a broader mix of interactions between force elements.[64] The authors posit that uncrewed systems are part of a continued 'hider-finder' dynamic in the air domain.[65] They refute the idea of a drone revolution.[66] Nevertheless, even this critical examination concludes that uncrewed aerial systems can be effective when integrated with other systems, including ground forces, which, in other words, are part of a combined arms effect.[67] Indeed, the works by Hecht and Calcara et al.

demonstrate that even published critics do not completely dismiss the efficacy of uncrewed aerial systems.

Allied and adversary forces continue to develop and deploy robotic and autonomous systems. A United States Department of Defense report to Congress highlights that China is developing human-machine teams, uncrewed aerial systems and swarming technology for surveillance, reconnaissance and strike functions.[68] Operations in Mali saw the Australian-built Drone 40 uncrewed aerial system deployed by Britain and the THeMIS uncrewed ground vehicle deployed by Estonia.[69] The THeMIS system has also been deployed in Ukraine and is so highly prized that Russia offered a bounty for its capture.[70] Reporting by the Wall Street Journal highlights that the current conflict in Ukraine has demonstrated the vulnerability of Russian armour to Ukrainian drones.[71] In response, Russia is deploying increasingly numerous sophisticated surveillance systems and kamikaze drones.[72] This mass employment in Ukraine has no doubt influenced the US Army to articulate an 'urgent' requirement for a drone to be deployed by infantry to destroy enemy armour.[73] It is clear that uncrewed systems are becoming both more lethal and more common.

It is fair to say that uncrewed systems are no longer an 'emerging technology'. In a comprehensive paper on small uncrewed aerial systems and their countermeasures, Dr Carl Rhodes observes that these systems are 'not only a threat for the future' because 'they have already proven effective against some of the world's leading military forces'.[74] The Department of Defence and the ADF should therefore assume that these systems will be prolific on the battlefield.

Regardless of how common they are, an assessment of uncrewed systems must examine whether they suit the Australian Army's intended effect and operational environment.[75] Australian Army officers James Easton and Joshua Kolo argue that even special operations should be grounded in low-technology capabilities, augmented with high-technology assets.[76] Limitations of robotic and autonomous systems include information security, data bandwidth, and the limited autonomy present in current systems.[77] In addition, the jungle, narrow trails, and tropical wet season of the Indo-Pacific will inevitably present challenges for uncrewed systems. However, the Army's major platforms can all be constrained by the environment, so these challenges are insufficient to dismiss a capability. Uncrewed systems would offer enhanced situational awareness and strike capabilities for a small force in agricultural, rural, urban and coastal terrain.

The Australian Army has no armed uncrewed systems or loitering munitions in service.[78] However, Army will introduce its first loitering munition, the Switchblade 300, into service in 2025.[79] Whether this capability will be widely issued to the general-purpose force or held as a boutique capability for a small group of users remains to be seen. The Australian Army, with its limited ability to absorb casualties, should seek to find and strike the enemy before being located, and uncrewed systems are very effective in that function. Uncrewed systems are not considered to be a silver bullet, but they should nevertheless be an integral part of the combined arms system in the 2020s.

A 'Dark Mystic'—Ethical and Legal Implications of Lethal Force from Uncrewed Systems

Despite common misconceptions, uncrewed systems are subject to the same international humanitarian law as other weapons. All new weapons are reviewed under Article 36 of Additional Protocol I of the Geneva Conventions for their legality. American Associate Professor of Law Rebecca Crootof asserts that Article 36 already captures autonomous systems and that no additional treaties are specific to them.[80] Similarly, the Stockholm International Peace Research Institute found that international humanitarian law does not preclude autonomous functions or weapon systems.[81] The study notes that users must 'reasonably foresee and limit the effects of the use of force' and that this requirement applies to all weapons.[82] Australian researchers Damian Copeland et al. found that weapons with advanced autonomy may need their autonomy curtailed in some situations but could still be used legally.[83] Overall, there are no immovable legal obstacles to employing uncrewed systems, even with autonomy.

Australian parliamentarians seem open to the idea. A 2015 Australian Senate inquiry recommended that Australia 'support international efforts to establish a regulatory regime for autonomous weapon systems, including those associated with unmanned platforms'.[84] Yet the same inquiry recommended that the ADF 'acquire armed unmanned platforms when the capability requirement exists and the Australian Government make a policy statement regarding their use'.[85] Australian authors Allan Gyngell and Dr Stephanie Koorey note that the Australian Government considers a ban on lethal autonomous weapons systems premature.[86] In fact, the Department of Defence has publicly defended the use of Australian-built

drones by Ukraine against Russia, despite Russian complaints.[87] It is clear that there is legal and political support for employing lethal force from uncrewed systems within existing regulatory frameworks, so the use of such systems as part of a disrupt force concept is both legal and likely to be politically acceptable.

Of course, legal employment of a weapon does not guarantee ethical employment. The campaign to 'Stop Killer Robots' demonstrates that there are elements of society with concerns about the use of lethal force by autonomous systems.[88] Perhaps this influenced the 2015 Senate inquiry's recommendation that the Department of Defence 'strengthen its public communications about military unmanned platforms', describing a 'dark mystic' in perceptions of the platforms.[89] However, a desire to avoid taking life with uncrewed systems must be balanced against unnecessary loss of ADF personnel. Uncrewed aerial systems, for example, reduce personnel exposure and could save Australian lives by doing so.[90] Legal and ethical questions around the employment of uncrewed systems were not a focus of 1 RAR's experiments, but external Defence stakeholders raised these concerns with members of the disrupt force. A nation which values its soldiers must consider the morality of exposing people to injury and death, or even mission failure, when an uncrewed system could complete their task. In this light, the Army must quickly grapple with any residual discomfort in order to employ the Switchblade 300 from 2025.[91]

Experimentation in Force-on-Force Exercises

In 2021, 1 RAR's Commanding Officer tasked Combat Team 'Charlie' to develop the unit's capability in airmobile operations—that is, the movement of troops by helicopter across large distances and rugged terrain to conduct missions against the enemy. Combat Team Charlie would form a disrupt force focused on inserting via air movement. In this instance, the concept of the disrupt force centred on deploying around 20 kilometres ahead of the battlegroup to conduct reconnaissance and disrupt enemy routes and vehicle hides. Air movement was, therefore, judged to be the best method of deployment. The intent was that the force would increase the tempo of the battlegroup by seizing key road junctions, creek crossings and approaches so that following combat teams could hurry through them to assault objectives.

The aim was to attack the opposing force and disrupt their plan. 'Air assaults', where troops land on or within weapons range of their objectives, would be extremely risky against armoured forces and would concentrate rather than disperse the disrupt force.[92] Therefore, the disrupt force would employ 'deep' airmobile operations. The idea of what 'deep' is will vary depending on the scale of operation, but 'deep' airmobile operations were distinguished in planning by the insertion of infantry beyond the battlegroup's first objectives and well within the enemy's rear area. This approach reduced the likelihood of the disrupt force being located quickly. It also meant the force would march many kilometres on foot to reach their objectives, requiring additional rations and water.

Enabling Technology

Two types of small vehicles augmented the disrupt force. First, the force was provided with the Hunter Wolf uncrewed ground vehicle to extend its operations ahead of the battlegroup without resupply. The Hunter Wolf is a waist-high-wheeled vehicle that carries up to 1.5 tonnes, with a dual diesel-electric motor piloted by a soldier with a controller.[93]

The Hunter Wolf uncrewed ground vehicle. Source: Supplied by HDT Global

The combat team was also provided with Polaris crewed all-terrain vehicles to enable a direct comparison with uncrewed ground vehicles, assessing the advantages and disadvantages of each.

A soldier drives a Polaris all-terrain vehicle in the Royal Australian Navy's HMAS Adelaide during Exercise Sea Explorer 2022[94]. Source: Defence Image Gallery

The disrupt force obtained commercial off-the-shelf multi-rotor uncrewed aerial systems, which were used to develop reconnaissance methods and tactics. Some soldiers were also trained in military uncrewed aerial systems such as Defendtex's Drone 40 and Drone 155, as Army sought feedback on those products. The Drone 40 is a 40-millimetre diameter quadcopter. Its modular payload can provide cameras for reconnaissance or high explosives to attack targets.[95] The Drone 155 is a larger form factor designed for greater range and heavier payloads.

The Defendtex Drone 40. Source: Defendtex data sheet

Finally, the disrupt force employed Samsung Galaxy S9 smartphones running 'Android Team Awareness Kit' (ATAK), an open-source battle management system. This is an Android application installed on handheld devices such as the S9. The app passes orders and reports between teams in a wireless mesh network, displaying the location of each device.[96] Like all battle management systems, it relies on being within range of other devices and not being disrupted by electronic warfare. The image below depicts the user interface.

Android Team Awareness Kit loaded on a handheld device[97]*.*
Source: Google Play Store

The combination of small vehicles, uncrewed aerial systems and a battle management system was intended to enhance the combat team's endurance and situational awareness. The following exercises explored how human-machine teams can fight more effectively than teams consisting only of humans. However, such teaming was also expected to alert the combat team to new forms of tactical friction. Combining technologies in one combat team could provide insights into more than just the effectiveness of one product; it could also offer a broader examination of how human-machine infantry teams could fight and survive in the Indo-Pacific. Thus, the exercises were conducted with two aims: immediate tactical training for the current force and longer-term experimentation to integrate technology with tactics. The exercises involved hundreds of officers and soldiers who spent thousands of hours in the field, allowing themes to emerge over time for various observers. Table 1 summarises the employment of the disrupt force in exercises over 2021 and 2022.

Table 1: Combat teams and key exercises, 2021–2022

Exercise	Duration	Number of personnel	Formed by	Focus
Battlegroup Warfighter Exercise	10 days	90	A rifle company and attachments	Deep airmobile operations; initial experiments with uncrewed systems; comparison of manned all-terrain and uncrewed ground vehicles
Exercise Talisman Sabre 2021	14 days	90	A rifle company and attachments	Refining employment of uncrewed platforms; setting of conditions around battlegroup objectives
Exercise Sea Explorer 2022	14 days	100	Specialist infantry teams from Support Company	Specialist cells forming a disrupt force for amphibious operations
3rd Brigade Warfighter Exercise	14 days	120, increasing to 150	Specialist infantry plus cavalry, engineers, surveillance, and electronic warfare	Specialist infantry integration in an armoured battlegroup

Early Force-on-Force Experiments—the Battlegroup Warfighter

The first major activity for the disrupt force was a Battlegroup Warfighter, adjudicated by Army's Combat Training Centre. Warfighter exercises are demanding force-on-force activities where both the training audience and the opposing force aim to 'win'. Soldiers and vehicles carry sensors that detect when they have been 'shot', enhancing realism. The Combat Training Centre records the forces' positions, awards 'casualties', and assists the force in collecting lessons learned. This challenging environment was perfect for testing concepts and producing realistic observations.

In 2021, the disrupt force consisted of three rifle platoons, an anti-armour section, and sometimes a sniper pair and a reconnaissance patrol. The Warfighter exercise, conducted over 10 days near Townsville, Queensland, began with the disrupt force inserting into the 'battlefield' via an airmobile operation. The force then patrolled around 15 kilometres on foot to the objectives and reconnoitred opposing force positions and movements. Initially the disrupt force focused on observing and reporting. Later it ambushed routes with anti-armour weapons, called in artillery fire on vehicle hides, and secured creek crossings required by the advancing battlegroup. Avoiding decisive engagements, the disrupt force did not employ techniques like attack or area defence. Instead, during two multi-day iterations, the disrupt force approached objectives through deep airmobile operations, disrupting the opposing force and setting conditions for the battlegroup's success on objectives.

The all-terrain and uncrewed ground vehicles were critical enablers, loaded with stores. The Hunter Wolf vehicles each carried two days of supply for a platoon and could recharge radio batteries from their motors. This capability allowed the combat team to move further, faster and with lighter packs, and cache the vehicles in concealed locations to be used later for resupply. Each platoon carried uncrewed aerial systems with a few kilometres range from the operator. These systems were therefore layered with patrols and manned observation posts. ATAK devices were spread across the combat team with antennas to produce a meshed network. Together, these technologies enhanced endurance, mobility and situational awareness. Of course, not everything went according to plan—and such friction should be expected (and indeed welcomed) during experimentation as limits are tested across a range of scenarios and environments.

Lessons Learned from the Battlegroup Warfighter

Uncrewed systems require significant training time to maximise their utility. In early patrols, uncrewed ground vehicles became stuck in deep creek lines, requiring time and effort to recover. Such delays drained the vehicles' batteries faster than expected, leading to the use of the louder diesel motor, increasing the risk of detection by the opposing force. Based on this experience, it would be tempting to conclude that the uncrewed ground vehicles were not helpful. Instead, the real lesson is that the disrupt force had not conducted sufficient training on them before a demanding exercise, as some situations were caused by user error. All platforms require operator proficiency to offer full capability. As the exercise progressed, soldiers used uncrewed ground vehicles more effectively, underscoring the importance of training in achieving full capability.[98]

Small support vehicles enhance infantry endurance. The all-terrain and uncrewed ground vehicles proved valuable as small supply caches, which teams returned to between missions. Without them, the infantry could not carry the supplies, especially sufficient water, to endure for five or more days. This capacity was crucial, as resupply from the battlegroup was often impractical due to proximity to the opposing force. Historically there are precedents for the logistic augmentation of dispersed combat teams. Pack animals have provided carriage of stores in the past. Allied and Japanese troops used mules in large numbers during the Burma campaign, and the Australian SOF employed mules in Afghanistan.[99] However, robotic systems offer different advantages to those provided by pack animals and the two are not interchangeable. A particular benefit of an uncrewed system is that it can be cached and left in place for multiple days, remaining silent and ready to function.

Uncrewed aerial systems excel at locating mounted force elements. When used by soldiers with adequate training before the exercise, uncrewed aerial systems immediately proved effective. While these systems struggled to detect infantry, they were frequently able to detect the higher thermal and visual signatures emitted by vehicles. Once these were identified, the disrupt force targeted them with anti-armour ambushes or artillery. This force destroyed at least 14 opposing vehicles and sustained only light casualties, demonstrating a disproportionate effect against unsupported armoured elements.[100] A handful of casualties and some ammunition were a very favourable trade for the opposing force's expensive armoured vehicles

and their occupants. The opposing force deduced over time that a light infantry force was operating in the area but struggled to narrow down the location of the teams harassing their hides and routes. Hence, the exercise demonstrated the criticality of integration between infantry and armour and the difficulty in locating and targeting dispersed infantry.

Very-short-range meshed networks are ineffective in a disrupt force. The ATAK carried by teams struggled to maintain connectivity due to the limited range provided by the commercial radios used by the disrupt force. As teams distributed themselves over wide areas, the devices could not exchange location data or messages, demonstrating why equipment must be tested beyond the laboratory in demanding units in the field. Even in relatively open terrain, the meshed network often failed due to its very short range, but the value of the ATAK was neither proven nor disproven. The exercise simply showed that the small radios used offered insufficient range for a combat team in this role.

Army teams need to accept some failures in testing concepts and technologies. As the examples above demonstrate, experimentation can produce useful observations even when an idea does not work. This realisation was hard to accept for some, as Army places much importance on achieving the mission. However, challenges with technology generated valuable lessons and defined areas for improvement in the next exercise, Exercise Talisman Sabre 2021.

Comfort with Technology—Exercise Talisman Sabre

The disrupt force's missions on Exercise Talisman Sabre resembled those on the Battlegroup Warfighter. Again, the force consisted of three rifle platoons, a reconnaissance section and a sniper team. It was inserted via a deep airmobile operation to reconnoitre objectives and to observe the opposing force's routes. The missions had a greater emphasis than previously on finding and securing routes and key locations for the benefit of other combat teams, including directly guiding them to assault objectives quickly. Finally, in a tactic reminiscent of Slim's 'roadblock', the disrupt force also ambushed reinforcement and withdrawal routes, allowing an opposing force to advance towards the battlegroup before 'shutting the gate' behind them, preventing withdrawal.[101]

Lessons Learned from Exercise Talisman Sabre

Increased exposure and training improved the effectiveness of uncrewed systems. As training continued between exercises, on Exercise Talisman Sabre the disrupt force was able to use uncrewed ground vehicles more effectively in rugged terrain. Commanders better understood the employment of uncrewed ground and aerial systems and could visualise how they would be used. While it was unsurprising that teams had naturally become more effective over the training year, the mental shift among members of the disrupt force was particularly notable. Specifically, operating with uncrewed systems was now an accepted norm rather than something daring and novel. This shift is consistent with experiences in the United States Marine Corps, where teams that embraced uncrewed ground vehicles gained more benefits than teams that resisted the vehicles or saw them as a burden.[102] In addition to their acceptance of the technology, junior soldiers began to speak enthusiastically of 'hunting' the enemy, demonstrating a light infantry mindset that had taken time and effort to inculcate.

The disrupt force reliably set conditions for decisive manoeuvre by other combat teams. On Exercise Talisman Sabre, the disrupt force set conditions around objectives more consistently than on Exercise Warfighter. This outcome was likely due to increased training, and thus the disrupt force provided greater tactical value. Twice, the force patrolled from landing zones to urban objectives, reconnoitred them, and successfully set conditions for combat team assaults. This included securing landing zones and routes for combat teams from the United States Army and Marine Corps, leading them to positions selected by the disrupt force. When the assaulting combat team reached their objective, the opposing force was reconnoitred and isolated, unable to withdraw or reinforce itself. These enormous tactical advantages resulted in rapid and effective clearances of objectives. These missions highlighted the ability of the disrupt force to set the conditions for other elements to conduct decisive manoeuvres, including the allied elements that are likely to work closely with the Australian Army in conflict.

While guiding combat teams to objectives is a familiar reconnaissance role, the disrupt force provided further functions. It established a sub-unit headquarters positioned forward to lead planning for the assault. It also held sufficient combat power to disrupt the opposing force, isolate objectives, and secure rather than merely identify locations to be used. These missions

underscored the utility of a well-trained disrupt force enhanced by uncrewed platforms.

Evolution of the Disrupt Force—a New Force Structure for 2022

In 2022, 'Support Company' 1 RAR took responsibility for the development of the disrupt force. Support Company provides specialist infantry such as snipers, reconnaissance, mortars, anti-armour, and signals capabilities to combat teams and the battlegroup headquarters in an infantry battalion. Usually these specialist teams are distributed among the combat teams based on rifle companies, such as the reconnaissance patrols, sniper teams and anti-armour sections assigned to the disrupt force in 2021. However, in 2022, Support Company was task-organised into a disrupt force in its own right. The purpose of this change was to examine the effects that could be achieved by many specialist teams operating without rifle platoons. This structure resembled Kempt's skirmishing mist concept (with its specialised cells dispersed over a wide area) and offered an opportunity to test the idea in the field.[103]

While enabling 1 RAR to more fully test the utility of a disrupt force, this new force structure had the inevitable consequence of reducing the infantry assets available to the other combat teams. Australian infantry battalions currently contain only three rifle companies, a support company, and a combat service support company. By concentrating its specialist assets in the disrupt force, the remainder of the battlegroup would possess reduced firepower and tactical options. Hence, there was a direct trade-off between the amount of combat power available to the disrupt force and that available in other combat teams. This placed the onus on the disrupt force to create the conditions under which these combat teams would be able to achieve their mission.

Some soldiers and officers now in Support Company had been part of the disrupt force in 2021. Their experience allowed lessons to be carried forward as well as an opportunity to test fundamental assumptions about how teams would organise and fight. Support Company does not possess the skills or equipment to form the mist.[104] However, combinations of existing teams could form the reconnaissance, strike, command and support cells that are part of the skirmishing mist concept. In the field, the company reorganised

into those cells. While the change in nomenclature may seem trivial (teams had previously been referred to as a 'sniper quad' or a 'mortar section'), it served to underscore the effect that the team was to focus on. 'Strike', for example, is a function, not a piece of equipment or a position on the unit's establishment. The shift also emphasised that teams could be formed from any soldiers required, regardless of barracks organisation.

Support Company formed a disrupt force consisting of the following teams:

- A top-level command cell was formed by personnel from the combat team headquarters and joint fires team. Each existing platoon headquarters then formed additional command cells to focus on specific tasks such as the reconnaissance battle or coordination of fires. These subordinate command cells could also assume control of the combat team if the combat team headquarters was destroyed or experienced degraded communications.
- Strike cells consisted of an anti-armour detachment of four soldiers and, in most cases, a pair of snipers or a mortar fire controller. This mixed grouping allowed a team to threaten enemy vehicles and dismounted soldiers at range. Kempt's skirmishing mist concept does not define 'strike' but provides examples of physical attacks, including offensive support, direct-fire weapons, and uncrewed combat air vehicles.[105] Therefore, strike cells were organised, trained and equipped to attack enemy forces directly.
- Reconnaissance cells consisted of reconnaissance soldiers who would scout terrain and opposing forces. Sometimes, signals-qualified soldiers joined these teams to maintain communications.
- Mortar sections were able to fire high explosives on enemy positions, as reported by other cells, and support the withdrawal of small teams under pressure. It was envisioned that in future, these teams might deploy loitering munitions or armed uncrewed aerial systems and, therefore, become more general 'offensive support' cells.
- A combat service support team held larger stores and would resupply teams in the field.
- While Support Company could not perfectly generate a skirmishing mist without pioneers and a cyber-electromagnetic activities cell, it

could nevertheless generate a sufficiently similar force structure. This reorganisation enabled many small specialist cells to provide effects over a larger area than is traditionally achievable by platoons that tend to concentrate in a location for tactical actions. The change also provided junior commanders sufficient freedom of action to act quickly within their area of responsibility. While small teams carried out discrete missions, platoon and combat team headquarters could focus on coordinating larger effects as the battle progressed. The 2022 disrupt force order of battle (ORBAT) is shown in Figure 1.

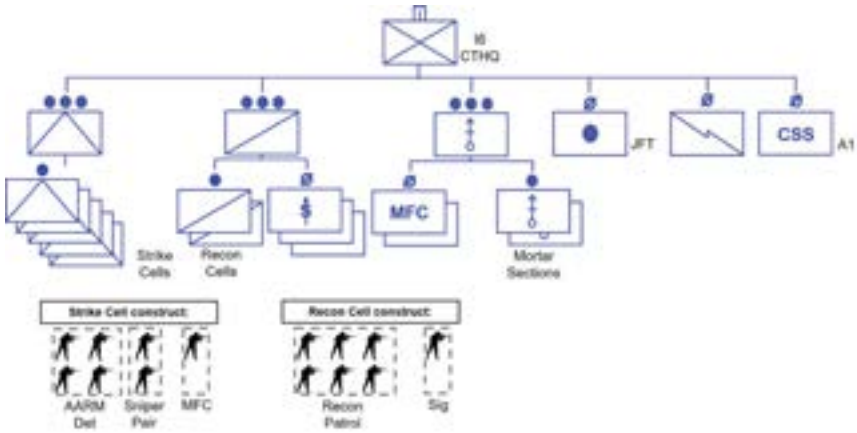


Figure 1: India Six order of battle for Exercise Sea Explorer, May 2022. Source: created by author

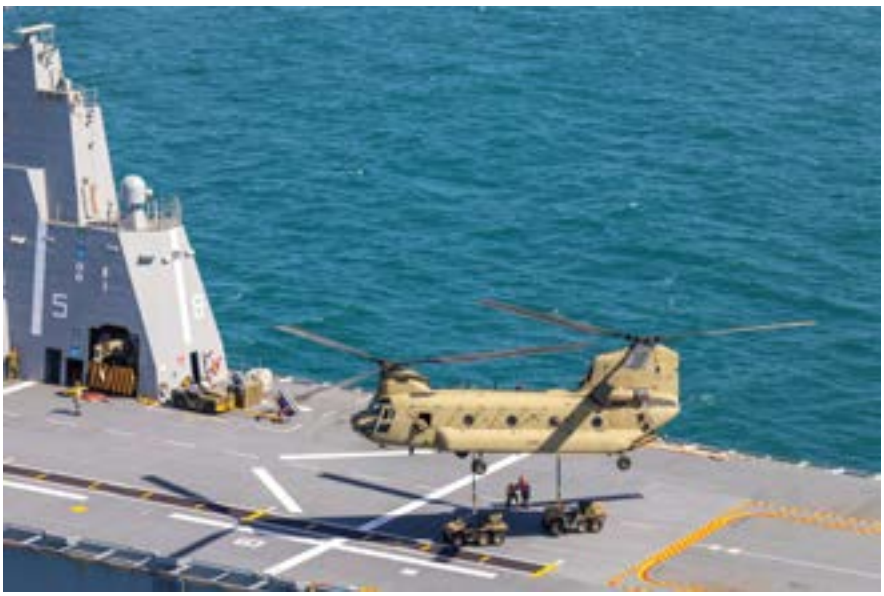
The Disrupt Force in a Littoral Environment—Exercise Sea Explorer 2022

The first exercise for 2022, Exercise Sea Explorer, saw the battlegroup lodging ashore from the Royal Australian Navy's HMAS Adelaide. In keeping with Australian doctrine, this did not represent an opposed landing on a well-defended beach but rather a lodgement where the opposing force lacked combat power or was absent. The exercise occurred before 2023's DSR, but lessons learned remain relevant to an Army optimised for littoral manoeuvre.

Some challenging training was agreed upon with the joint pre-landing force of the 2nd Battalion (2 RAR), which specialises in amphibious operations. The disrupt force would conduct an airmobile operation onto land and disperse itself. The joint pre-landing force would then seek to land in small

boats and penetrate the area. The exercise would challenge each force's ability to remain undetected while locating their opponents.

The disrupt force worked to apply the skirmishing mist concept to a specific threat and terrain. The force moved into the battlespace in CH-47 Chinooks, then dispersed into areas of responsibility assigned to teams. The image below depicts the insertion of all-terrain vehicles along with soldiers loaded on the CH-47 from the deck of the HMAS *Adelaide*.



Two all-terrain vehicles are lifted as part of the airmobile operation conducted by India Six on Exercise Sea Explorer 2022[106]*. Source: Defence Image Gallery*

Lessons Learned from Exercise Sea Explorer

Dismounted force elements are very hard to find in a littoral environment. The disrupt force and the joint pre-landing force both struggled to locate opponents. Operating in dense vegetation with both sides seeking to avoid detection, the two forces only occasionally located each other.[107] Unsurprisingly, the disrupt force found it more challenging to locate dismounted infantry teams than the armoured forces it had encountered on previous exercises. These outcomes reinforced previous observations that infantry can conceal themselves effectively from uncrewed aerial systems when they are not moving. Equally, major Army platforms with powerful sensors were unable to detect the disrupt force despite

being provided with specific locations to search. The sheer difficulty of detecting infantry who do not wish to be seen must be considered in littoral operations.

Assigning areas of responsibility to small teams can be effective. Employing the new ORBAT showed considerable potential. In particular, it demonstrated the benefit of widely dispersing specialist teams to allow junior commanders to exercise their initiative and disrupt the enemy.

Occasionally two teams were assigned to the same area with different missions and with instructions to coordinate face to face when required. In other cases, teams were instructed to quickly coordinate across boundaries if that would allow them to seize an opportunity. Direct coordination between teams reduced reliance on radio communications, with a concomitant reduction in the likelihood that electronic warfare assets would locate them. In one example, when a reconnaissance cell detected an opposing patrol, they immediately coordinated with a nearby strike team to ambush it. This action was fast, coordinated at the lowest level, and did not require radio transmissions to a higher headquarters. By setting expectations in advance in an environment of mission command, small teams were empowered to seize opportunities.

The last exercise would take place in contrasting terrain and in an armoured battlegroup, drawing out new observations.

Integration with Armour—the 3rd Brigade Exercise Warfighter

The final exercise saw the disrupt force integrated with Battlegroup Eagle, based on the 2nd Cavalry Regiment. In this exercise the disrupt force acted as the opposing force. The mechanised Battlegroup Kapyong (based on the 3rd Battalion, Royal Australian Regiment) formed the training force to be opposed.

Unlike previous exercises, where the disrupt force had focused on offensive operations, this activity offered the chance to contest a mechanised advance and to employ specialist infantry within the armoured Battlegroup Eagle. Ideally the disrupt force would inflict delay and attrition on Battlegroup Kapyong's advance across the training area towards urban objectives.

The image below depicts the combat power available to Battlegroup Kapyong, including M113 armoured personnel carriers and M1A1 Abrams main battle tanks.

Battlegroup Kapyong assembled for the 3rd Brigade Warfighter, in which the large number of armoured vehicles and infantry would challenge the disrupt force[108]*. Source: Defence Image Gallery*

The disrupt force's command team assessed that small teams acting independently would be destroyed piecemeal as the terrain was quite open, providing a substantial advantage to armoured manoeuvre. Therefore, a plan to delay the mechanised force required more centralised control. This plan may appear inconsistent with the previous premium placed on freedom of action for teams within the disrupt force. However, this decision reflects the fact that all battlegroups must deploy their capabilities in ways that properly account for the mission, threat and terrain. In the case of this exercise, centralised control of the disrupt force was warranted.

Due to the large distances involved, the disrupt force was inserted into the exercise in Bushmaster protected mobility vehicles. While the vehicles' mobility and protection offered advantages, they would become unhelpful later in the exercise.

As Battlegroup Kapyong advanced, the disrupt force extensively employed snipers mounted on all-terrain vehicles. These snipers, who generally operated 20 kilometres ahead of friendly forces, were able to describe the movement and activities of the opposing force, call for artillery fire on key assets such as headquarters and main battle tanks, and later directly engage the enemy with sniper rifles. Next, 10 kilometres ahead of the main body, reconnaissance cells kept Battlegroup Eagle informed of the advance to support planning. Due to the disrupt force's deep area of operations, it had time to observe, understand and disrupt the advancing armour. As Battlegroup Kapyong advanced closer to the disrupt force's main body, the anti-armour weapons of the strike teams were synchronised with mortar and artillery fire on wire obstacles laid over creek crossings. This situation can be contrasted with experiences later in the exercise when the proximity of armoured elements meant that the disrupt force had very little time to observe and disrupt their actions, resulting in combat power being quickly brought to bear against it.

As the exercise progressed, the disrupt force was supplemented by further attachments including, at times, a cavalry troop, a mounted surveillance troop, a light electronic warfare team, engineers, and an additional infantry platoon. These capabilities provided additional tactical options but grew the disrupt force closer to a 'battlegroup minus' rather than a combat team. This situation added complexity to planning efforts and increased the battlegroup's reliance on the disrupt force.

Concurrent with these actions, the Army's Combat Application Laboratory, which provided the enabling technology to the disrupt force, achieved a key milestone in their development of photogrammetry in the field. Photogrammetry is a process in which many two-dimensional photos are taken—often by an uncrewed aerial system—and processed to create a three-dimensional digital terrain model. The image below provides an example of the model generated of a key objective, made available to commanders on ATAK devices to assist in planning.

A screenshot from a three-dimensional model of an objective generated and provided to planners in the field. Source:created by author

Lessons Learned from the 3rd Brigade Warfighter Exercise

The disrupt force is vulnerable to concentrated combat power. Twice during the exercise, the disrupt force was overwhelmed by rapid mechanised and armoured advances in reasonably open terrain. Several teams were destroyed, or bypassed and placed in a tenuous position. This outcome indicates a tactical-level vulnerability that could be exploited by adversaries. Conversely, actions by small teams earlier in the exercise were effective when conducted in vegetated terrain at a greater distance from the main body. These outcomes showed that a disrupt force works best when able to conceal itself in complex terrain until teams can generate a local advantage at a time of their choosing, picking apart an opposing force and setting the conditions for the battlegroup over days rather than hours. This observation mirrors the principles outlined in Kempt's concept of a skirmishing mist.[109]

Dispersed infantry must take risks and plan for extended withdrawals. While achieving some worthwhile effects, elements of the disrupt force were exposed to substantial risk of destruction. Sniper teams and reconnaissance cells were sometimes isolated, surrounded or bypassed by much more powerful opposing elements. The risk was somewhat mitigated by plans for teams to marry up with the remainder of the disrupt force, sometimes days later. One particular highlight of the exercise involved a sniper pair explaining, in their morning report, that they were surrounded

closely by opposing tanks and could not move for an extended period of time. In another example, a reconnaissance cell remained behind to locate opposing artillery as most of the disrupt force withdrew. These situations demonstrated that teams must have contingency plans to deal with the prospect of being surrounded or bypassed, and must have sufficient supplies on small vehicles to sustain themselves during an extensive withdrawal. Tellingly, the brutal calculus of war meant that the disrupt force was prepared to accept very high levels of risk to that reconnaissance cell—including their loss—if it meant the force could locate and destroy long-range fire platforms (even if, in this case, the artillery was not detected).

The disrupt force is much more effective in conjunction with offensive support. On earlier exercises, the employment of offensive support by the disrupt force (such as mortars and artillery) had demonstrated great promise in offensive operations. The Brigade Warfighter exercise confirmed that it is also essential in defensive operations. The risk of teams being isolated could be partly ameliorated by ensuring that offensive support could fire to support their withdrawal. Several times, this tactic prevented the disrupt force from taking unnecessary casualties.

The need for supporting fires is linked to the low signature of the disrupt force. Because small infantry teams go to great lengths to conceal themselves, the area can appear to their opponents to be a tactical 'gap' and a route free of opposition through which a force might advance quickly. On exercise, some strike cells were destroyed when the disrupt force's opponents advanced with substantial combat power into this perceived gap. Safely withdrawing disrupt force teams in such close proximity to the opponent's armour required three simultaneous fire missions. These incidents showed clearly that offensive support is a critical enabler for dispersed infantry when it is facing greater combat power. In this regard, loitering munitions might complement mortars and artillery in the very near future.

The disrupt force is an effective grouping for specialist enablers and more effective than a standard combat team with the same task. Because the disrupt force is inherently flexible, it readily adapted to the additional attachments that were available from other units from time to time during the 2022 exercise. These attachments included specialist infantry and non-infantry elements (including additional uncrewed systems and a Royal Australian Air Force airfield survey team). With increased firepower and

greater options for finding and striking opposing forces from these added capabilities, the disrupt force achieved better outcomes than had been possible in 2021.

Despite the benefits of specialist infantry teams and many non-infantry attachments, one downside was that they made command and control more complex. The skirmishing mist concept requires many teams of 12 to 20 personnel to report to a single battlegroup headquarters.[110] This structure skips existing echelons, including the combat team and platoon headquarters. In practice, the diverse nature of the disrupt force's ORBAT meant that planning and execution were much more challenging whenever the platoon headquarters were not present, particularly as more disparate elements were attached to the force. The availability of so many effects meant that subordinate headquarters were necessary to coordinate them. For example, one platoon headquarters coordinated all sniper teams, reconnaissance cells, surveillance elements and electronic warfare detachments. Clearly, dispersed infantry benefit from multiple layers of command and control rather than many teams reporting to a single headquarters.

Large vehicles can be a disadvantage to the disrupt force.
Finally, it is worth examining the use of vehicles like the Bushmaster. These were generally a disadvantage to the disrupt force because they made concealment and withdrawal more difficult. The exercise demonstrated the criticality of small support vehicles—with a lighter and more concealable footprint—instead of larger platforms. It may have been easier to withdraw bypassed teams if they had been working as light infantry and did not need to plan for their large vehicles' size, noise, and thermal signature. In this regard, the difficulty of concealing the vehicles was not a suitable trade to gain their otherwise excellent mobility and ballistic protection. These findings should inform the employment of a small vehicle to support dismounted troops in order to address the capability gap currently filled by an ad hoc mixture of all-terrain and uncrewed ground vehicles.[111]

Overall, the exercise demonstrated that the presence of specialist infantry in an armoured battlegroup imposes a lethal dilemma on the enemy. Therefore, it represents a force multiplier which Army should explore further.

Summary of Lessons Learned in the Disrupt Force, 2021–2022

As seen from the evolution of disrupt force concepts and tactics during the 2021–2022 period, experimentation was an iterative, explorative process, not a straight path to success. However, the following themes can be derived from these two years of field experience:

- Like all platforms, uncrewed systems require time and training to deliver maximum capability to the user.
- Small support vehicles enhance the endurance of light infantry, allowing it to operate for longer periods without resupply while maintaining a very low signature.
- Uncrewed aerial systems enhance situational awareness and support a disproportionate effect by allowing a force to trade cheap munitions for expensive opposing land assets.
- A trained disrupt force can increase battlegroup tempo by reliably setting the conditions for decisive manoeuvre by other combat teams, including those of Australia's allies.
- It can be effective to assign areas of responsibility to small teams who then coordinate closely and use their initiative.
- Integrating specialist infantry with armour imposes a lethal dilemma on the enemy. Conversely, the disrupt force remains vulnerable to concentrated combat power such as an armoured advance.
- A disrupt force is most potent when operating in complex terrain and provided with offensive support.

The experiments took place within the context of an Army operational unit, and the following sections describe the challenges encountered in that context.

Cultural Friction Points in Experimentation

The most consistent friction point in experimentation was resistance to change. Therefore, in a fresh approach for 2022, all participants were asked to avoid statements like:

- This is the way we have always done it.
- We do it this way because it is in our doctrine.
- This will never work.
- This doesn't help me personally.
- This is not perfect (implying that the idea should be abandoned).

While service is a Defence value, soldiers can have a natural aversion to additional tasks. Whereas a commander is likely to appreciate the endurance provided by an uncrewed ground vehicle packed with rations and water, to an operator it may just look like more work. Preparing and piloting a vehicle across challenging terrain at night can feel like an imposition to a soldier who cannot see the full benefit of the new technology. In the context of the experimentation, organisations supporting the disrupt force would sometimes hear negative feedback on a platform from junior soldiers without full context. Without denigrating the contribution of junior soldiers, Army needs to be cognisant that different roles will bring different perspectives to new technology or approaches.[112] While soldiers should be asked about the useability of a system, commanders should be asked about the effect it provides.

Generating a Culture of Human-Machine Teams and Understanding Risk

Army will face cultural challenges in employing uncrewed systems. Soldiers initially expressed concern about using uncrewed ground vehicles for casualty evacuation where the vehicle operates semi-autonomously or is accompanied by only a few soldiers. This was seen as an unethical abandonment of the casualty, in contrast to the team carrying the wounded soldier on a stretcher with extensive security around them. However, in

some operational environments uncrewed platforms may represent the wounded soldier's best chance of survival. This is particularly the case when working far ahead of other friendly elements, as every casualty evacuation risks exposing the position of the whole force. Soldiers within the disrupt force were more accepting of this new method for casualty evacuation once they had tried it in the field and seen how quickly a team can move a casualty. Similar experimentation by the United States Marine Corps has demonstrated that teams which view the uncrewed ground vehicle as a useful asset and tool gained greater utility with less effort and frustration during missions.[113] Clearly, the way that an uncrewed ground vehicle is viewed by the team matters and must be managed by commanders.

It is challenging to evacuate casualties in ambulances or helicopters without making it clear to adversaries that the disrupt force is present. Commanders will face difficult choices between evacuating casualties and concealing the broader force. It may help to wargame some agreed scenarios with the team beforehand to consider what circumstance will justify an evacuation. Of course, a similar risk is already accepted in existing force elements involved in the initial lodgement of troops into a littoral environment. Army must rethink what it means to look after its people; this might not mean evacuation conducted immediately or conducted by crewed platforms.

Assumptions of Technological Superiority

In a final point on cultural obstacles, the disrupt force repeatedly encountered a dangerous assumption that Western forces would consistently defeat adversary platforms and tactics. The author has directly observed discussions that underestimate our adversary's capability in uncrewed systems. Perhaps infrequent exposure to these platforms has led to a false perception that they are 'emerging technology'. Some Australian Army officers are unaware that uncrewed systems are prolific, lethal and well established in foreign forces. Therefore, Army cannot assume technological superiority if it takes many years to integrate capabilities, pursuing perfection as the DSR describes.[114] The following section examines organisational areas in which Army and the ADF could make adjustments to accelerate the uptake of capability.

Organisational Friction Points in Experimentation

Access to Lessons Learned from Experimentation

Observers sometimes offered that the disrupt force's systems and tactics had been tried before and were well understood by small parts of Army. This can be summed up by one experienced officer's comment that while the concepts were interesting, 'that's not new'. This statement contained a kernel of truth, as very few warfighting techniques are completely novel, but it also highlighted an opportunity for organisational improvement. It was challenging, sometimes impossible, for the disrupt force to build upon past work, due to restricted access to information. Collaboration and sharing results from experiments are areas in which the ADF can and must improve.

Requests to other units and headquarters for reports or lessons learned often went unanswered or unapproved, while international partners tended to be very responsive. This siloing of information on trials or experiments risks wastefulness in time, resources and personnel. Rather than deliberate replication to confirm results, it generates unintentional duplication of effort. In practice, information sharing often relied on personal relationships or chance meetings rather than systematic information exchange.[115] There was no suitable mechanism for units to share the concepts they were working on or to find others with whom they could collaborate. In 2024, the Defence Science and Technology Group commenced collation of a Defence Research Register. This work could potentially form that basis of a centralised platform that supports collaboration, reduces duplication and improves efficiency, with inputs provided by teams conducting trials, experiments and research in Defence.

Regulation and Policy around Uncrewed Systems

The employment of uncrewed aerial systems in training is heavily restricted in the ADF, which detrimentally affects the development of tactics. Governance is provided by the Defence Air Safety Regulations, which are intended to harmonise with and amplify Commonwealth work health and

safety law.[116] Under the regulations, Army operators are only authorised to fly uncrewed aerial systems within the operator's visual line of sight, by day, within a restricted operating zone, and not over built-up areas.[117] Broader use is allowed in limited circumstances, but few combat units have sufficient knowledge of the Defence Air Safety Regulations to know how this can be lawfully achieved. At various times, the unit was prohibited from attempting the logical next steps in employing uncrewed aerial systems, such as launching from protected mobility vehicles or landing craft, carrying a payload, or handing control of the system between operators. On one joint exercise in 2022, once military airspace control was implemented on top of the Defence Air Safety Regulations, the disrupt force could fly uncrewed aerial systems for only six out of every 24 hours. In all of these examples, the development of tactics was limited not by what the technology was capable of but by Defence regulations.

By restricting training, these controls transfer risk to commanders and soldiers who may have to fight without the aid of uncrewed aerial systems or employ them in situations they have not trained for. Australia's adversaries could capitalise on this lack of training by operating at night or in urban areas. Since 2023, adjustments have been made to the Defence Air Safety Regulations, allowing more practical training with uncrewed aerial systems, with authority for expanded use appropriately pushed down to commanders. By contrast, though, some European nations routinely employ uncrewed systems in war and are therefore far more experienced in their use. Defence training areas create an environment in which users can manage risk and control outcomes far more effectively than on a real battlefield. They present an opportunity to challenge commanders and operators of uncrewed aerial systems prior to imposing the friction of true combat. In the same way that the ADF conducts live fire training so a user's first rounds are not fired in combat, it should routinely and fully employ uncrewed aerial systems in training. The ADF should review how it trains with uncrewed aerial systems to ensure they become an integral part of the combined arms system.

Organisational Tempo and the Resourcing of Experimentation

Because experimentation occurred in parallel to the unit's ordinary taskings, high organisational tempo and limited resourcing hindered the development

of the disrupt force. On top of the training commitments and staff work required every year, the unit also wrote standard operating procedures, safety cases, technical risk assessments, risk management plans and user requirements for experimental capabilities. The personnel conducting this work did not have a strong background in technology or capability. Concurrently, the same unit deployed forces to domestic operations relating to floods and COVID-19, to international operations to train Ukrainian troops, and to evacuation of Australians from Kabul. Those operations were the clear priority over longer-term experimentation, but the cumulative effect was to increase fatigue within the workforce. The aim to 'modernise through' major exercises provided excellent training opportunities, but the objective was not associated with the allocation of additional time.

Development of tactics and technology requires appropriate time and personnel to be achievable within a sustainable workload. If experimentation is not adequately resourced, Army risks creating a 'perverse incentive' where units may anticipate the lack of support and avoid participating, leading to tactical stagnation. A unit must, therefore, be given the time to do the deep work of developing tactics and technology. The designation of the 1st Armoured Regiment as an experimental, rather than operational, unit supporting the Army Accelerated Capability Pathway is highly promising.

If adequately resourced, and supported by appropriate technical and regulatory expertise, the 1st Armoured Regiment will be positioned to conduct experimentation more effectively than comparable operational units. Any personnel supporting the 1st Armoured Regiment must be formally tasked with doing so rather than advising on an ad hoc basis. A habitual, formal relationship between a unit and its supporting experts will generate better results than informal support to an operational unit that occurs concurrent with the individuals' other responsibilities. The following section proposes a model for a combat team sized disrupt force, taking a conceptual rather than prescriptive approach to provide a starting point for units to leverage past experiments.

A Proposed Model of the Disrupt Force

'Small forces are usually employed by the enemy in their deep strikes and if counterattacked may find it difficult to withdraw.'

Captured North Vietnamese instruction pamphlet describing United States airmobile operations[118]

Proposed Role and Employment

In this paper, the disrupt force is presented as an exemplar of dispersed infantry tactics, and its utility was clearly demonstrated during tactical experiments. It is possible that many of the observations made here about the disrupt force are applicable to disaggregated light infantry more generally—and this is something that commanders of battlegroups may wish to explore further.

The tactical experiments indicated that the disrupt force is best employed to set the conditions for decisive manoeuvre of the battlegroup. The disrupt force achieves this through reconnaissance and surveillance, isolating objectives and siting approaches to them, targeting the opposition's assets, reinforcements and withdrawal routes, degrading its command and control, denying its freedom of movement and frustrating its plans. Supporting the integrated force, the disrupt force provides surveillance and reconnaissance that enables the employment of joint fires across sea, land or air domains. The image below depicts the disrupt force setting conditions for the battlegroup on Exercise Sea Explorer 2022.

Having secured a landing zone, members of the disrupt force unhook guns of the 4th Regiment, Royal Australian Artillery, from a CH-47 Chinook; these guns would later fire on battlegroup objectives.
Source: photograph taken by author

Teams are generated from groupings of soldiers and skill sets adapted to the mission and then dispersed over a wide area as a disaggregated force providing synchronised effects. The combat team headquarters centrally coordinates actions when required and orchestrates conditions for decisive manoeuvre. The force may include additional attachments such as specialist reconnaissance, surveillance, electronic warfare, cavalry or engineers.

The disrupt force operates best when it is dismounted, ideally in conjunction with small dismounted support vehicles. In light of this, discussions around the use of light infantry throughout the next decade should include those who move on foot with such assets. Enabled by small vehicles, the disrupt force would be able to deploy quickly through an airmobile operation into the Indo-Pacific.

The disrupt force attacks through infiltration and defends through ambush. It holds enemy platforms at risk using anti-armour weapons, robotic and autonomous systems, and offensive support. The force operates without body armour to increase its endurance and accepts that the enemy may bypass some of its teams.

As the skirmishing mist concept predicts, the disrupt force works best when

given enemy-focused mission task verbs such as ‘neutralise’ or ‘disrupt’.[119] The strengths of the disrupt force are its low signature, its effects over a wide area under junior commanders who set the conditions for decisive manoeuvre, and its potential for rapid deployment into the Indo-Pacific. Conversely, the force’s vulnerabilities are its isolation from resupply and evacuation assets, limited organic combat power, communications over long distances, and susceptibility to opposing infantry. Meanwhile, the disrupt force’s positions may appear as an unoccupied ‘gap’ to the enemy, who may concentrate combat power in that area—presenting both a risk and an opportunity. Commanders must consider these factors when assigning tasks to the disrupt force and when articulating the mission and intent to subordinate commanders.

In offensive operations, a disrupt force could deploy into a littoral environment via helicopter to reconnoitre an objective for a larger element such as the Australian amphibious force. This would not replace the role of SOF or the joint pre-landing force. Instead, the disrupt force is a battlegroup-owned asset that could be layered with them, or one that that could release them to focus on other missions deeper in the battlespace. The disrupt force could identify enemy positions, isolate an objective by ambushing reinforcement and withdrawal routes, and coordinate fires to destroy enemy reserves, logistics vehicles and command and control nodes. Finally, the disrupt force could increase the tempo of operations by siting landing zones and routes and by guiding combat teams to the assault. These actions would enable battlegroups to approach objectives faster, against a weakened (or distracted) enemy. Figure 2 depicts a concept for the disrupt force’s employment in offensive operations in a littoral environment.

Figure 2: Disrupt force conceptual employment in offensive operations. Source: created by author

In defensive operations, the disrupt force could shield vital Australian platforms such as long-range fires and anti-air missile systems. The force would achieve this by delaying and disrupting an enemy's approach rather than by providing local security to the platforms. The force could also complement those capabilities in implementing a strategy of denial, either by acting as part of a tripwire to force an adversary out of the 'grey zone' and into armed conflict (as Carr and Frühling describe), or by providing security to those high-value platforms (as Palazzo has argued).[120] Ultimately, tactical engagements by the disrupt force would support key land assets in achieving operational effects.

Implications for the Fundamental Inputs to Capability of Generating the Disrupt Force

Fundamental inputs to capability are 'capability elements or inputs, which, in combination, form the basis of capability' such as personnel, collective training, and industry.[121] All capabilities require these elements, so some areas for examination are outlined below. Because the force is drawn from existing infantry, some of the necessary inputs are already in place because these personnel can be trained, equipped and organised for the tasks.

Major systems and organisation. The disrupt force requires anti-armour, reconnaissance and communications systems and is much more effective when augmented by uncrewed systems. Each battalion aiming to form a disrupt force would require a substantially higher number of uncrewed aerial systems and, ideally, some form of dismounted support vehicle, whether crewed, uncrewed or a combination. The disrupt force need not necessarily be a permanent structure as long as teams have trained for the role. A nascent disrupt force can be formed comparatively quickly as long as commanders balance the resourcing of the other combat teams and the employment of the disrupt force to set conditions for the latter to conduct decisive manoeuvre. As Army makes significant acquisitions such as landing craft, long-range fires and anti-air weapons, the fundamental inputs to capability for a disrupt force seem comparatively manageable. The disrupt force can therefore provide an extra tactical option for commanders using people and assets already on the ORBAT.

Training areas. Training with uncrewed aerial systems and ground vehicles requires a mature training and regulatory framework reflecting current trends in warfare. A pragmatic solution is to view uncrewed systems as vehicles or weapons rather than a novel category of capability requiring special regulation; for example, loitering munitions are just another way of delivering the effect from the operator to the target. Granted, there are additional complications, such as the ability of an armed uncrewed system to move before striking. Fortunately, Army has over a century of operational experience in employing lethal systems. The challenges of employing armed uncrewed systems are within Army's collective ability to resolve.

Industry. The disrupt force presents a compelling opportunity to support the Australian defence industry while further engaging our partners in the Pacific. Australian firms continue to develop products such as uncrewed

aerial systems, countermeasures, and uncrewed ground vehicles. Some Australian systems are already acquired and fielded by overseas buyers on operations.[122] There is little doubt that Australian industry can provide the uncrewed systems required for the disrupt force.

In addition, Pacific nations may look to increase their lethality without relying on expensive vehicle platforms. The disrupt force employs tools that may be purchased from Australian companies and offers skill sets and systems that could generate disproportionate effects for small Pacific nation armies. This situation represents a unique opportunity for Australia to support Pacific nations' security objectives and to enhance interoperability with the Australian Army while supporting Australian manufacturers.

Areas for Further Development

Units have abundant opportunities to contribute to developing tactics and force structures. First, while infantry and armoured elements have always cross-attached to each other with great effect, a gap remains in Army's collective understanding about how specialist infantry teams can best support decisive manoeuvre by armour. Armoured and infantry battlegroups should consider collaborating to develop a concept to address this deficiency.

Second, the absence of any air defence or counter-uncrewed aerial system weapons in the disrupt force was evident in the field. The Stinger air defence system exemplifies the kind of capability to be explored: light, man-portable, and relatively simple compared to those employed by specialists. Such weapons may further limit an adversary's freedom of action by offering a persistent threat to enemy rotary wing assets.

Third, it is yet to be seen how the disrupt force can operate most effectively in urban environments. These environments offer very different challenges in concealment to the Australian bush or tropical jungle in which the disrupt force exercised. With appropriate planning, future major exercises may involve the insertion of a disrupt force into a built-up urban community.

Finally, the number of uncrewed systems available to the unit did not represent how pervasive they are in current conflicts. Army should explore the effects of large numbers of uncrewed systems at the tactical level, especially where one operator can control many devices. Similarly, the disrupt force possessed no armed uncrewed ground vehicles, a situation that might usefully be remedied on future exercises. The common theme between the uncrewed aerial and ground systems is mass; uncrewed aerial systems are pervasive now, and uncrewed ground vehicles may become more common in the future. Army should explore their effects in large numbers.

Recommendations

There is much for Army to consider, yet none of this is beyond the organisation's capacity and ingenuity to implement. Four recommendations are derived from the unit's experimentation.

1. Infantry and armoured battlegroups should further develop the disrupt force or related tactics. This should include employing uncrewed platforms, very-short-range air defence weapons, and countermeasures against uncrewed aerial systems. To more fully develop the employment of infantry in a combined arms fighting system, units should explore disrupt force tactics in built-up areas and in conjunction with armour.

Assuming the lessons are shared, further work in the field will transition improved infantry and combined arms tactics from experimental ideas to a known and trainable capability. Importantly, the tactics described in this paper need not be contained to a designated disrupt force but might advance combined arms tactics more generally when they involve dispersed infantry. To achieve this, there is a natural division of labour between experimental and operational units. Operational units have access to extensive force-on-force exercises, so they should focus on developing tactics with current systems and those undergoing trials. The 1st Armoured Regiment, well supported by subject matter experts and shielded from responsibility for contingency operations, is better placed to focus on technological experiments.

2. The ADF should review its ability to train with uncrewed aerial systems. This will ensure a safe generation of capability, as a lack of training with any system only makes its employment in war more dangerous. A suitable measure of success would be the amphibious lodgement of a force at night around built-up areas, concurrently using crewed and uncrewed air assets as part of the operation. The outcome should be an organisational preparedness to integrate uncrewed aerial systems with other elements rather than to control risk by grounding them.

3. Army should experiment in the field with massed uncrewed systems. The 1st Armoured Regiment should lead experimentation on massed uncrewed systems. The regiment should be well supported by experts in technology and regulation who are formally tasked to assist with the work. In order to maintain its focus on experimentation, the

regiment should remain shielded from responsibility for generating forces for contingency operations.

4. The ADF should provide a mechanism for collaboration and sharing lessons learned from tactical and technological experiments and research. This would enable teams experimenting across the organisation to collaborate by sharing their past results and current projects. Units should be encouraged to provide inputs to such a mechanism, including lessons learned and ongoing trials and experiments, and to interrogate the tool with a view to finding other teams to collaborate with.

It is telling that, despite being partly underway now, recommendations 3 and 4 were identified two years ago by those attempting to experiment. These recommendations should be taken as both validation of current efforts, and justification to add further momentum to what is currently nascent work.

Conclusion

Without ongoing adaptation such as that described in this paper, existing tactics and technology may well be insufficient to meet the challenge of Australia's adversaries. In addition to positing theories on warfighting, Army is compelled to experiment in the field and distribute the lessons learned.

An examination of infantry tactics from World War I onwards concluded that infantry have long operated in dispersed teams to disrupt the enemy's plans and to set the conditions for decisive manoeuvre. Now Western armies are converging on successor tactics, where specialist infantry are augmented with uncrewed systems to hold expensive enemy assets at risk. From examining recent wars, it is obvious that uncrewed systems represent not a potential challenge on the future battlefield but a known one on the battlefield of today. Logically, uncrewed systems will be prolific on the battlefield, whether or not they are available to Australian soldiers.

Seeking to advance discussion on tactics enabled by such uncrewed systems, this paper presents a unit's tactical and technological experimentation over two years to form a disrupt force. A key theme has been how a light infantry force augmented with uncrewed platforms can hold costly opposing land assets at risk and disrupt their operations, offering a disproportionate effect compared to resources expended. There was no linear path to success, but the exercises produced a model of how infantry could provide disproportionate effects, including through integration with aviation, armour and artillery.

The disrupt force model provides a basis for further development. While almost certainly imperfect, experiments demonstrated enough potential in the field to warrant further investment in the concept. Further work may develop infantry and combined arms tactics more generally, leveraging dispersion, mixed teams or uncrewed systems. This practical insight cannot be gained through speculation in the officers' mess or examination of theory alone; units must deploy into the field and experiment. Battlegroups should continue the development of the disrupt force or related tactics, while Army more broadly ought to explore the employment of massed uncrewed systems. The ADF should review its ability to train with uncrewed aerial systems, which is currently very limited. Finally, a

mechanism should be implemented to enable collaboration and sharing of lessons learned in technological and tactical experiments, with a lead agency (within Army or the wider enterprise) owning the collaborative process.

Army has some time and opportunity available before great power rivalry in Australia's region risks escalation to war. The Australian, United States and British armies have independently examined the disrupt force concept to deliver lethality in a highly deployable force. Large experiments in the field indicate that the skirmishing mist, disrupt force and similar concepts deserve further development in units supported with technical and regulatory expertise. Army's designation of the 1st Armoured Regiment as an experimental unit offers a unique opportunity, yet the foundational tactics and force structure can be employed in today's units while technology is being introduced to Army. Our battlegroups can develop disruptive and modern tactics through demanding force-on-force exercises now, or those same lessons can be learned later, at much greater cost, through the trauma of war.

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109 The skirmishing mist is 'based on the principle of small independent teams operating disconnected, disaggregated and decentralised below the detection threshold'. Kempt, *'Skirmishing Mist'*, p. iii.

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112 As a counter-example, one private wrote detailed, thoughtful feedback on the Hunter Wolf from his team's perspective when asked the right questions.

113 Vorm, 'Autonomous Casualty Evacuation', p. 27.

114 *Defence Strategic Review 2023*, p. 20. The authors argue that Defence's 'approach to capability acquisition … needs to abandon its pursuit of the perfect solution or process and focus on delivering timely and relevant capability'.

115 In one instance, it was only discovered that 1 RAR and a Navy team were working on a similar problem through a face-to-face discussion at a technology demonstration. In another example, correspondence to a unit which was resourced specifically for experimentation received no reply. A later face-to-face discussion included the prospect of collaboration, which failed to materialise.

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118 John J Tolson, *Airmobility*, 1961–1971 (Department of the Army, 1973), p. 27.

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120 Carr and Frühling, *Forward Presence for Deterrence*, p. 17; Palazzo, *Resetting the Australian Army*, p. 29.

121 Department of Defence, *Defence Capability Manual*, p. 11.

122 Australia should not underestimate its existing capacity in this particular area. DroneShield's 'DroneGun' was successfully fielded by Brazil to defeat UAS at their presidential inauguration: 'DroneShield Deployed at Brazil's Presidential Inauguration', *Asia Pacific Defence Reporter*, 3 January 2023, at: https://asiapacificdefencereporter.com/droneshield-deployed-at-brazils-presidential-inauguration/. Remote weapon stations manufactured by EOS are contracted for by Ukraine: 'EOS Secures Second Ukraine RWS Contract', *Australian Defence Magazine*, 28 April 2023, at: https://www.australiandefence.com.au/defence/general/eos-secures-second-ukraine-rws-contract. SYPAQ's Corvo drone was deployed to Ukraine: Paul Smith, 'Cardboard Drone Maker Used in Ukraine Is Australia's Top Innovator', *Australian Financial Review*, 27 September 2023, at: https://www.afr.com/technology/cardboard-drone-maker-used-in-ukraine-is-australia-s-top-innovator-20230921-p5e6fm. And the Defendtex Drone 40 was deployed by the British Army in Mali: Lye, 'British Army Using Small Grenade-Launched Drone in Mali'.

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