Contemporary Issues in Air & Space Power
Air and Space Power Centre

Fryer, D. (2024). Aligning emerging concepts and capabilities with Mosaic Warfare. *Contemporary Issues in Air and Space Power*, *2*(1), bp41567496.
https://doi.org/10.58930/bp41567496

Strategy

Aligning Emerging Concepts and Capabilities With Mosaic Warfare

David Fryer[1,2]

[1] Australian Defence Force, [2] Australian Defence College, Deakin University

Keywords: Operational Strategy, Technology, Mosaic Warfare, Deterrence, Asymmetric Advantage

https://doi.org/10.58930/bp41567496

Vol. 2, Issue 1, 2024

This paper examines how mosaic warfare can align emerging concepts and technologies with the Australian Defence Force's (ADF) strategic objectives in response to the increasing threats in the Indo-Pacific. By adopting mosaic warfare principles, which focus on decision superiority, disaggregated force structures and adaptability, the ADF can significantly enhance its deterrence capabilities. This alignment with emerging technologies and operational concepts offers a pathway to a more effective and credible deterrence strategy. The paper concludes that a strategic shift towards mosaic warfare should be considered to ensure the ADF can maintain relevance and effectiveness. Such a shift necessitates changes in defence procurement, development of sociotechnical systems, and realignment of the force structure. Adopting mosaic warfare would substantially improve the ADF's ability to maintain a sustainable, asymmetric advantage in a complex geopolitical landscape.

1. Introduction

The Australian Defence Force (ADF) must continue to adapt to meet the challenge of rising geopolitical tensions and potential for great power conflict. The driving element for change is that the ADF's posture, structure and capability is continually tested in meeting the strategic challenges of our times (Houston & Smith, 2023). Like other Western militaries, this struggle has manifested slowly over the decades, primarily resulting from the global proliferation of sophisticated military technologies (Raska, 2019).

In this period of growing uncertainty and tension, the ADF needs a sustained military advantage. The *National Defence: Defence Strategic Review* (DSR) identified that a comprehensive re-evaluation of existing strategies through a bold embrace of technological advancements and emerging warfare concepts could achieve such an outcome (Houston & Smith, 2023). Embracing these requirements and transitioning from the current *force-in-being* to a *future integrated force* requires a principles-based, manoeuvrist approach to warfare that enables Defence to achieve deterrence (Clark et al., 2020).

Adopting mosaic warfare could enable the ADF to align emerging concepts and capabilities to secure a strategy of deterrence through denial. The paper is divided into three core segments to ascertain the relevance and suitability of this conceptual framework to the operational imperatives of the ADF. Section 2 examines the emergence of the mosaic warfare concept, followed by a detailed analysis of its foundational principles and theories. Section 3 analyses the pacing threat to Australia and the corresponding military strategic commitments required to address this threat. Having established a clear understanding of mosaic warfare and the Australian context, Section 4 will evaluate if mosaic warfare can align emerging concepts and capabilities to secure a strategy of deterrence through denial. Through this analysis, it will be demonstrated that adopting mosaic warfare could enable the long-term, credible, multi-domain advantage necessitated in the DSR and *ADF Theatre Concept ASPIRE* for the *future integrated force* (Department of Defence, 2022).

2. Mosaic warfare

2.1. The emergence of mosaic warfare

A good strategy aims to solve a specific problem. Accordingly, before determining the applicability of mosaic warfare, it is crucial to examine the original context that gave rise to this operational concept and the problem it sought to mitigate. Pursuing a strategy of deterrence by denial since the early 1990s, the US Department of Defense (DoD) has constantly sought to define the nature of post-industrial warfare to develop a leading concept of victory (Hammes, 2005; Raska, 2019). Although continuously evolving, this concept was rooted in the understanding that light, dispersed forces equipped with advanced technology will dominate the future battlefield through tightly integrated networks (Hammes, 2005). The cornerstone of this concept is the prominence of decision superiority facilitated by information dominance and emerging technologies (Cebrowski & Garstka, 1998).

Central to the US strategy, the Indo-Pacific's prominence demands a focused approach in shaping a concept for victory in modern warfare. The Indo-Pacific is the most populous, dynamic and prosperous global region, making its future vital for all parties involved (Ratner et al., 2018). To achieve continued prosperity and peace, the US seeks a free and open Indo-Pacific underpinned by strong alliances, adherence to international law and the promotion of democracy and free trade (Department of Defence, 2019).

To enable this, the US needs to address their capability, operational and geographical vulnerabilities to re-establish military dominance in the Indo-Pacific. Mosaic warfare was designed to be an innovative operational strategy that would necessitate dynamic and unpredictable action to deter and neutralise threats (Austin, 2021).

To tackle these challenges, the US commissioned the Defense Advanced Research Projects Agency (DARPA) to develop a solution, resulting in the concept of mosaic warfare. Mosaic warfare is a post-industrial manoeuvre theory designed to achieve a sustained strategic advantage. The concept draws on decision superiority, the exploitation of new trends in technology, and the imposition of uncertainty on adversaries to provide an asymmetric advantage (Clark et al., 2020). Emerging as DARPA's leading concept of victory in 2019 (Burn, 2019), it was ultimately selected as the best approach to create decision superiority and adaptability for friendly forces while imposing complexity and uncertainty on potential adversaries in emerging critical regions (Clark et al., 2020).

2.2. What is mosaic warfare

Mosaic warfare is centralised on adaptability and flexibility, generating decision superiority. The concept leverages real-time human command and machine control to rapidly compose and recompose a disaggregated military force structure to create complexity and uncertainty for the adversary (Burn, 2019). The concept imposes multiple dilemmas upon the adversary, hindering their ability to achieve objectives by collapsing their decision-making cycle (Leonhard, 1991). From a practical sense, this concept involves packaging individual force elements (tiles) where actions of unique combat platforms are fused in unique approaches to enable multiple attacks in parallel across a wide frontage (the mosaic). This approach grants the ability to mass firepower unpredictably without massing forces, making identifying forces and their intent harder to ascertain for the adversary (Ioniţă, 2022).

An analysis of mosaic warfare identifies three theory-based, core principles that aim to secure an asymmetric advantage and thus enhance the strategy's robustness at every level. Specifically, the prioritisation of decision superiority, disaggregation of forces and adaptability of response are the principles that, both individually and collectively, enable the concept's effectiveness in the face of Indo-Pacific realities. These principles will form the framework to analyse mosaic warfare's applicability to aligning emerging concepts and capabilities to Australia's context later in this paper.

Principle 1 – Decision superiority: A decision-centric approach to modern operations is the core principle of mosaic warfare. At the heart of achieving decision superiority within mosaic warfare is military theorist John Boyd's Observe-Orient-Decide-Act (OODA) Loop as shown in **Figure 1** (Boyd, 1996; Osinga, 2007). Originally developed from dog-fighting and fast-jet tactics, the OODA Loop emphasises quick and effective decision-making to outpace and disorient adversaries. The faster a force can cycle through these steps—observe the situation, orient to the context, decide on a course of action and act—the more it can disrupt the enemy's decision-making process (Richards, 2020).

The theory biases towards action, particularly rapid action, to create confusion and delay in the opponent's responses. By increasing the number of actions and decisions a military makes, it forces the adversary to spend more time observing and orienting, thereby slowing their ability to decide and act—known as 'get[ting] inside the adversary's OODA Loop' (Angerman, 2004).

In practical terms, the OODA Loop is applied at a military operational and tactical level where information is analysed, and intelligence is acted upon. Additionally, militaries use this approach in targeting an adversary's assets through kinetic means, known as the kill chain or effects web (Lieber & Press, 2017). This principle aims for an asymmetric advantage similar to that in manoeuvre warfare, as it seeks to undermine the adversary's ability to develop and execute operational plans instead of directly targeting their forces (Angerman, 2004).

Principle 2 – Disaggregation of forces: The principle of disaggregation is the component of mosaic warfare that degrades the adversary's OODA Loop. In context, disaggregation of forces refers to the strategic breaking down of military units into smaller, modular components to enhance operational flexibility and resilience against targeted attacks. Central to the employment of a disaggregated force is the *Rhizomian* theory. In postmodernism, two biological metaphors—'tree form' and 'rhizome form'—describe organisational structures as characterised in **Figure 2** (Lawley, 2005). The 'tree form' metaphor is a centralised, hierarchical model deeply ingrained in Western military strategy, specifically in the Centre of Gravity (COG) concept.[1] This hierarchical structure is susceptible to targeted attacks that can compromise the entire system due to their identifiable compositions and perceivable purpose. Conversely, the 'rhizome form' represents a decentralised, adaptable, interconnected network that is more resilient to targeted disruptions. Due to the system's inherent complexity, military force structures or decision-making frameworks rarely implement this form (Zweibelson, 2023).

Mosaic warfare seeks disaggregation through machine-enabled control systems to manage the complexities of recomposable force structures and functions. This style of force structure degrades the enemy's ability to identify and target the vital constituents of military forces operating within enemy weapons range. To significantly degrade a Rhizomian structured force, an adversary must either at-

1 The term COG refers to the source of power that provides moral or physical strength, freedom of action, or will to act. U.S. Department of Defense. (2017). 'Joint Publication 5-0, Joint Planning', IV-26–IV-27

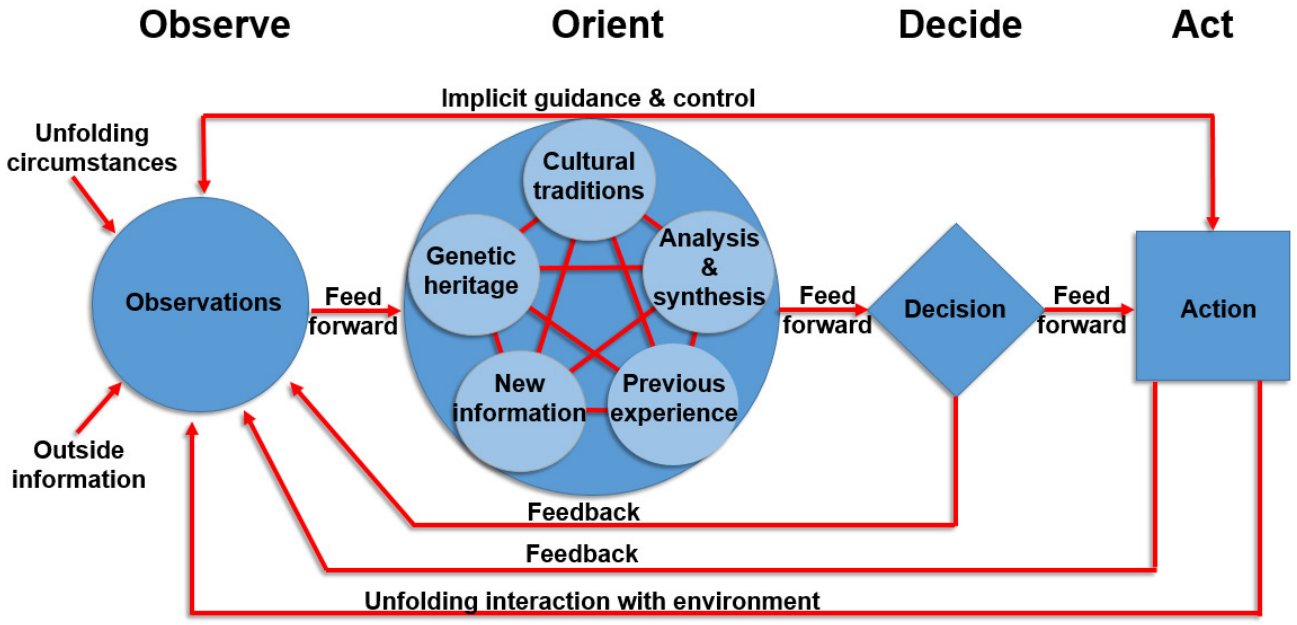

Figure 1. John Boyd's OODA Loop (Adapted from Boyd, 1996).

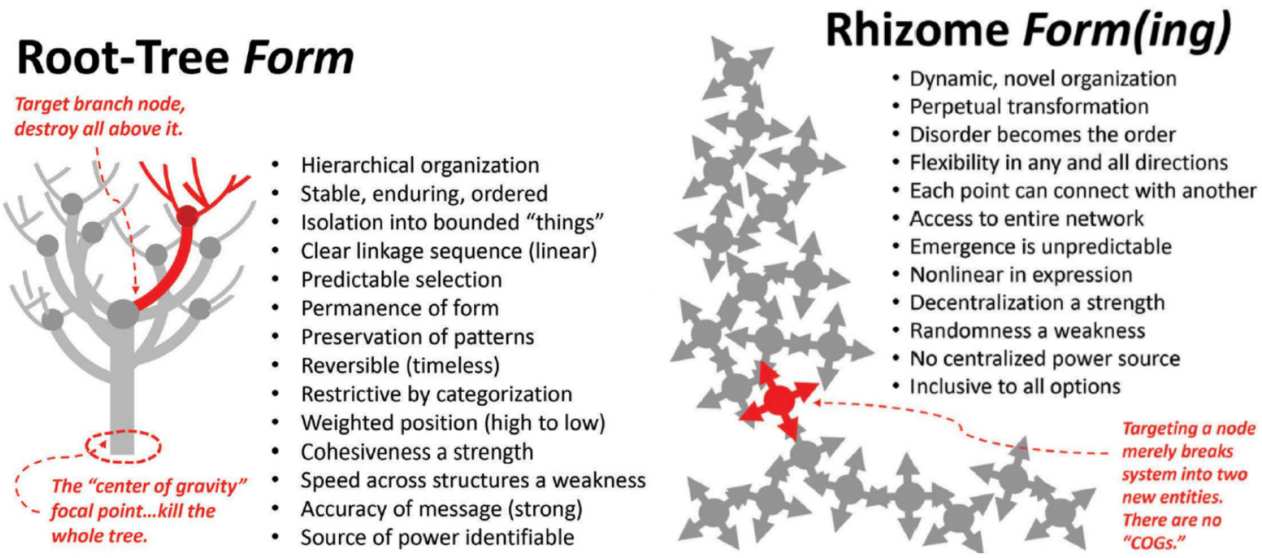

Figure 2. Biological Structures – 'tree form' (left) and 'rhizome form' (right) characteristics (Reproduced with permission from Zweibelson, 2023, p. 231).

tack most of the forces simultaneously or take excessive time to understand the force disposition, intent and tactics. Either approach would significantly constrain an adversary's military advantages and enable their opponents to deny or delay aggression with more negligible levels of force than needed with traditional military disposition (Clark et al., 2020).

Principle 3 – Adaptability of response: Adaptability is a critical source of military power. An integrated force draws upon capabilities and effects, such as command and control (C2) elements, sensors and weapons from all domains to dynamically increase their response repertoire. To make these elements adaptable, a requisite (proportional) variety of capabilities and effects are required to counter the situational variety of threats sufficiently (Ford et al., 2021). The adaptability of these elements contributes to the observing and deciding aspects of the OODA Loop and is positively correlated with the benefits of a disaggregated force.

The foundational theory of adaptability is Ashby's Law of Requisite Variety. The theory was derived from studies of complex system dynamics that posited that the variety of responses within a system must be at least as great as the system variety against which it seeks to regulate (Ashby,

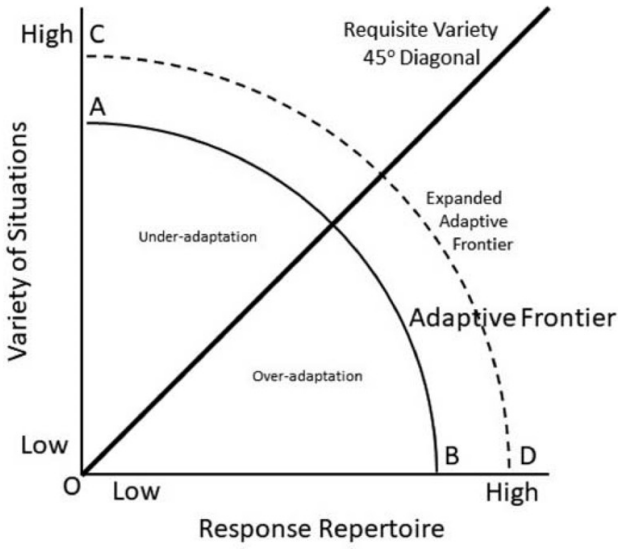

Figure 3. Ashby's Law of Requisite Variety (Reproduced from Ford et al., 2021)

1958). Additionally, this concept does not focus on specific capabilities but rather the possible configurations of their functions. Put simply, only variety can counter variety.

Failing to align the response repertoire with the situation variety will kill adaptability. The relationship between response repertoire, situation variety and effectiveness, as illustrated in **Figure 3**, are the enablers of adaptability. In this diagram, the response repertoires relate to the ability to make sense of different situations and functionally respond; this includes the degree, timing and sequencing of the enactments (Ford et al., 2021). Conversely, situation variety links to the type of change, the scale and scope, the depth of change, the type of interventions used, and the forms of resistance within the system (Ford et al., 2021). If a military falls above the requisite variety diagonal, it is said to be under-adapted to the situation. If below, they are over-adapted and have sufficient response options to counter the variety of the system. Outside of the under/over adaption region, conditions exceed the response repertoire of the controlling agent, leading to errors in sensemaking and inadequate response options. Finally, military effectiveness and improvements in operational success occur because of an expansion in the response repertoire, increasing the adaptive frontier of the controlling force, shown as transitioning from line AB to line CD.

Ashby's theory directly supports the achievement of manoeuvre warfare. Contextually, the commander discerns every manoeuvre executed by the adversary, deploying available resources and strategies to neutralise these actions and maintain system control. As the adversary's capabilities expand, so does the spectrum of potential enemy actions. To merely contain this escalating threat, the commander must possess the means to counteract the enemy's moves. However, achieving dominance necessitates an arsenal of weaponry and tactics that surpass the enemy's capacity for an effective, timely counter (Bushey & Nissen, 1999). The development of analytical frameworks for prioritising force elements and disposition based on the complexity and range of adversarial assets also accomplishes the practical application of the theory (Bushey, 1997).

Mosaic warfare navigates the complexities of the Indo-Pacific. The concept's core principles—decision superiority, disaggregation of forces and adaptability of response—collectively aim to establish an asymmetric advantage by imposing complex dilemmas on the adversary while increasing the speed and response options available to a commander. Before assessing the potential impact of mosaic warfare on the alignment of emerging concepts and capabilities for deterrence, a rigorous analysis of Australia's military context and its corresponding strategic imperatives is indispensable.

3. Understanding Australia's threats and strategy

Establishing a baseline that identifies the ADF's threats and strategy is critical to understanding the applicability of mosaic warfare. As such, this next section reviews two thematic elements. First, it will establish the Indo-Pacific threats to the ADF before, second, assessing Defence's strategic response to this threat. This assessment will then enable an evaluation of mosaic warfare's potential to achieve deterrence by denial.

3.1. Understanding Australian regional threats

Australia and the United States have shared interests for a secure, stable and prosperous Indo-Pacific. The emerging capabilities for actors within the Indo-Pacific to disrupt this vision include 'the next generation of ballistic missiles, nuclear and conventional, long-range precision-strike assets such as hypersonic vehicles, offensive and defensive cyber-capabilities, new classes of submarines supported by a variety of high-tech, directional rocket rising sea mines with accurate control-and-guidance capacity' (Raska, 2019, p. 88).

To counter these threats, the foundations of Australian military strategy have changed, and the ADF must adapt. For decades, the cornerstone of Australia's strategic policy rested on a pivotal pillar that Australia would have adequate warning time to prepare for and mitigate the risks of a large-scale conventional conflict (Dibb, 2001). The speed and scale of expansion by adverse actors in the Indo-Pacific and the lack of clarity regarding intentions have meant that Australia can no longer assume this strategic warning time (Dibb, 2001). This change has necessitated a call to action to increase military preparedness and accelerated capability development to meet the new strategic paradigm (Department of Defence, 2020). Accordingly, the Australian Government requires a sharpened focus on national interests and how to secure them (Carr, 2023). The endorsed strategic concept to accomplish this is deterrence by denial (Department of Defence, 2023).

Through deterrence by denial, Australia seeks to create uncertainty in the mind of the adversaries about the likelihood of success of coercion through force. This approach is intrinsically linked to the ability and intent to defend against and defeat acts of aggression. It compels the adver-

sary to abandon a planned strategy by altering its risk assessment and decision-making. Within the adversary, deterrence exists solely as a state of mind, making its credibility crucial yet challenging to assess (Houston & Smith, 2023).

To successfully deter, the ADF needs credible capabilities that counter the potential adversaries' advantages. Australia's *deterrence by denial* strategy converges around credible defence of the nation from attacks that target mobilisation, industrial base capacities, and power projection (Houston & Smith, 2023). Critical to this is a more robust regional missile defence: a distributed, resilient set of theatre strike capabilities—both ground based and anti-ship; C2 networks that are resilient to information warfare; innovative logistics and concepts of mobility; and a more distributed regional force posture (Clark et al., 2020). Australia's current force structure, posture and capabilities are ill equipped to credibly deny threats within this new paradigm (Houston & Smith, 2023). The following section discusses how adopting mosaic warfare can increase the effectiveness of the ADF in achieving deterrence.

4. Mosaic warfare: enabling a strategy of deterrence

This culminating analysis demonstrates how mosaic warfare aligns and enables the strategic imperatives facing the ADF. The overarching aim is to rigorously evaluate how adopting mosaic warfare can allow the ADF to align emerging concepts and capabilities in a manner that secures a strategy of deterrence through denial. Given the geopolitical tensions in the Indo-Pacific region, this section will scrutinise how the concept of mosaic warfare and its principles of decision superiority, disaggregation of forces and adaptability of response can be operationalised within the ADF's existing and future force structure. The objective is to ascertain if these principles can effectively mitigate vulnerabilities and contribute to Australia's credible deterrence posture.

4.1 Emerging concepts of a future integrated force

The DSR identifies the need to embrace emerging concepts to generate the credible advantage required for such a strategy (Houston & Smith, 2023). As part of this pursuit, emerging operational concepts enable the ADF to address the military problems of today and the future (Department of Defence, 2023). The leading US and Western concepts for post-industrial warfare generally devolve into three specific areas: multi-domain operations (MDO) (concept of convergence of combat power) (Wesley & Simpson, 2020), mosaic warfare (decision-centric warfare with manned-unmanned assets) (Clark et al., 2020) and Joint all-domain command and control (JADC2) (centred on the synchronisation new combat systems architecture) (Nilchiani et al., 2023).

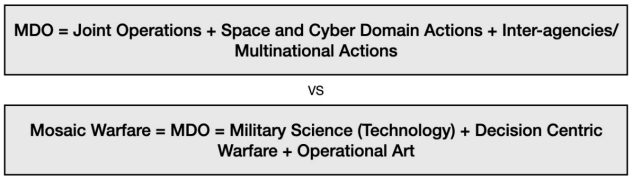

Figure 4. Operational Concept Comparison Multi-Domain Operations vs. Mosaic Warfare (Adapted from Ioniţă, 2022).

An adversarial focus is critical to the success of any operational concept. In a recent publication, the RAND Corporation found that many emerging concepts are overly generic, focusing on domains rather than adversaries (Johnson, 2018). This finding was further emphasised by the US Joint Chiefs of Staff, who identified a similar lack of attention on adversaries as a 'doctrinal void' for strategic competition (Joint Chiefs of Staff, 2023). MDO, JADC2, integrated warfare, and network-centric warfare are operational concepts that seek to maximise a nation's internal military power through optimisation and collaboration. While efficiencies raised through these approaches increase the objective power of a nation, they do not emphasise the role of the adversary, who also gets a vote in conflict. As demonstrated in **Figure 4**, mosaic warfare bridges the doctrinal void by prioritising decision superiority and operational art[2] as foundational elements.

Australia's current operational strategy outlines the means but lacks the foundational specificity to achieve them. ADF's operational strategy starts with the capstone concept, integrated campaigning, that outlines an MDO-style approach to achieving military power. Integrated campaigning's central idea, 'work with others to achieve more' (Department of Defence, 2023), is the focused aggregation and application of military force. Complementary to this is the ADF Theatre Concept ASPIRE. Developed in consultation with the DSR, it describes how strategic policy can be realised at the theatre level (Department of Defence, 2022). ASPIRE draws out three principles that guide how the ADF develops and applies military power: focus, asymmetry and cost imposition (Department of Defence, 2022). Unlike the principles of mosaic warfare, the principles of ASPIRE, while adversarial focused, remain too generic, providing a wide aperture for interpretation and undermining its direct applicability to shape future force structure or posture effectively. It advocates for the generalities of manoeuvre warfare without acknowledging the known capabilities and advantages of the adversary. This interpretation aligns too similarly to those principles that shaped the

2 Operational art can only be expressed in the face of an opponent; therefore, it is the activity that mediates and interprets the interactions between strategic and tactical reasoning. (Wass de Czege, 2011)

force-in-being, which are unsuitable for achieving deterrence (Houston & Smith, 2023).

Adopting the principles of mosaic warfare would enhance the credibility of Australia's deterrence posture. When discussing deterrence, there is a tendency to jump straight from a military strategy to the capabilities that enable it. This is what the DSR has done and, to a lesser extent, the ADF Theatre Concept ASPIRE. Both documents failed to recognise or address the function that operational concepts can generate towards shaping credible deterrence. As a future potential adversary may have the combined advantages of mass, economic resources and technological sophistication integrated under *unrestricted and System Destruction warfare*, the ADF needs more emphasis on actionable manoeuvre principles within their operational *warfare* concept (Liang & Wang, 1999). This is at the heart of mosaic warfare's three principles that achieve the balance of being non-prescriptive enough to allow commanders to fully employ operational art while providing sufficient description to shape the future structure or posture of the ADF to credibly deter an adversary.

4.2. Emerging capabilities of a future integrated force

Adopting mosaic warfare provides a practical, long-term strategic foundation for integrating current and emerging capabilities. The current force and its capabilities are known as the *force-in-being*, while the objective force to be achieved by 2031 is known as the *future integrated force* (Houston & Smith, 2023). Between now and 2031, the ADF needs to maximise the deterrent effect and response options of capabilities (Rahman & Gopal, 2023). Timely and strategically relevant capability acquisition is essential in maintaining a transient advantage (Houston & Smith, 2023). The principles of decision superiority, disaggregation of forces and adaptability of response provide the required specificity to differentiate it from the current capability drivers while also functioning as a framework for the integration and prioritisation of emerging capabilities to achieve deterrence by denial.

Principle 1 – Decision superiority: The next frontier in military competition will likely be information dominance and decision-making. By harnessing interconnected, emerging military technologies such as artificial intelligence (AI) and autonomous systems, the ADF could dynamically deter determined threats and attacks from adversaries (Austin, 2021). In the ADF, operators receive their commander's intent and operators can proceed even without communications and coordination controls. As such, the efficiency of networks and the speed of decisions would generate significant asymmetric advantages contributing to credible denial. In most cases, adversaries carry out inflexible coordination control where operators have limited autonomy (Solen, 2020).

Emerging sociotechnical system capabilities promise to enhance the efficiency of ADF networks. Acknowledging that communications may be compromised during conflict, decision-centric warfare advocates for a context-driven command and control (C2) approach based on available communications rather than pursuing an unfeasible and expensive fixed hierarchical network (Clark et al., 2020). The intricacy of such a context-driven structure necessitates a hybrid approach that integrates people, organisations and technology, collectively termed as a sociotechnical system (Baxter & Sommerville, 2011; Franssen & Kroes, 2009). This system aims to mitigate the limitations of traditional mission command by fusing human leadership with AI-assisted machine control. These advanced decision-support tools empower commanders to oversee dispersed forces, adapt to fluctuating environmental considerations, and introduce complexity into enemy decision-making processes (Clark et al., 2020).

This type of approach to capability development is not limited to DARPA. In a recent future concept paper, the ADF also identified the need for sociotechnical systems, referring to the central idea of the new command, control, communication and computing (C4) concept as *Hierarchical Command – Agile Control* (Department of Defence, 2019). In this framework, the structuring of ADF operations adheres to a hierarchical model rooted in core principles of command. Commanders subsequently establish mission tiers where control dynamics can be modified instantaneously based on unit availability. The agility of control allows the acting force, be it human or machine, to adapt proactively, taking advantage of emerging environmental opportunities (Department of Defence, 2019).

The traditional speed of planning staff is not fast enough for networked-enabled modern warfare. Speed to decision will be a critical enabling factor of *Hierarchical Command – Agile Control* in a future conflict. Moreover, communications at theatre levels are likely to be contested, reducing the ability of theatre commanders to manage forces to implement manoeuvre warfare dynamically (Clark et al., 2020). Decision superiority helps to shape emerging capabilities towards autonomous network controls to assist with this contested dynamic. These controls are designed to optimally manage the trade-offs among bandwidth, reach and latency; thereby facilitating effective communication with the forces that a commander requires to complete their assigned tasks successfully. This approach ensures that the commander's span of control remains manageable by excluding forces that are either too difficult to communicate with or not essential for the tasks at hand (Clark et al., 2020).

The sociotechnical control system will become indispensable for formulating courses of action (COAs). Within the framework of decision-centric warfare, this control system would solicit input from each participating unit or force element concerning their capacity to fulfil the commander's objectives. Units would provide information such as their geographical proximity to the operation, capabilities pertinent to the task and physical attributes. Subsequently, by utilising modelling and simulation techniques for potential operational concepts, the sociotechnical system would recommend one or multiple COAs for the commander's consideration. The commander and their staff would then scrutinise these proposed COAs for alignment with the overarching strategy (Waliany et al., 2018). This

COA development process would enable commanders to concentrate on the application of operational art instead of primarily focusing on devising tactics for attacking specific targets—a common practice in contemporary military operations (Clark et al., 2020). Ultimately, these approaches speed up and increase the effectiveness of friendly force's decision cycles while degrading the adversaries.

Principle 2 – Disaggregation of forces: Complex, recomposable capabilities can obscure critical ADF components, thwarting enemy intentions. Under system destruction warfare, adversaries have fielded capabilities to disintegrate relatively static SoS architectures or defeat self-contained platforms rapidly (Engstrom, 2018). The capability manifestation of this principle is the transformation of military forces from monolithic, platform-centric structures towards distributed composable systems. The transitions enable faster fielding of capabilities, increased interoperability and more adaptable and flexible systems (Burn, 2019).

The problem with exquisite platforms is their cost. Owing to this, multi-mission platforms are insufficiently abundant to secure the level of distribution or variety needed to create multiple operational dilemmas. This financial burden and limited availability necessitate safeguarding multi-mission platforms and troop configurations, thereby further constraining the flexibility of these force packages (Clark et al., 2020). Moreover, the protracted development cycles often associated with new military systems are ill-equipped to keep pace with the rapid turnover of electronic components and software in the commercial sector, potentially rendering new military systems obsolete before their deployment (Burn, 2019).

Capability under this principle translates to the transitioning to a more significant number of smaller elements with fewer functions. For instance, a frigate accompanied by multiple uncrewed surface vessels could serve as an alternative to a surface action group, or a section of strike fighters might be replaced by a single strike-fighter functioning as a C4 intelligence, surveillance, and reconnaissance (ISR) hub for an array of standoff missiles and sensor-fitted UAVs (Clark et al., 2020). There is no one-to-one solution for replacing crewed systems and functions with uncrewed ones; however, changing the structure of the organisation presents many new opportunities with emerging technology (Till, 2018). To realise this objective, a minimal portion of conventional monolithic units would need to be phased out to facilitate the acquisition and deployment of numerous smaller, more specialised forces. The DARPA report on implementing mosaic warfare identified that an investment of $100 billion created an operationally significant inventory of mosaic forces to achieve deterrence by denial (Clark et al., 2020).

Principle 3 – Adaptability of response: Traditional platform-centric warfare anchors ADF forces' predictability, thereby impeding decision superiority. The relatively inflexible architecture of monolithic multi-mission units and System of Systems (SoS) restricts the range of possible force package configurations (Hunter, 2020). It is imperative to conceptualise capability not as isolated systems but as a collective of collaborative systems designed to address specific tasks at the requisite time and location. The versatility and complexity attainable through mosaic warfare could bolster the ADF's ability to neutralise inflexible SoS forces (Clark et al., 2020). This potential is further enhanced by the disaggregation of capabilities into elements with singular or dual core functions, forming 'effects webs' where diverse combinations of sensors, weapons, and C4 components can fulfil identical objectives (Eckstein, 2016). The operational efficacy of such an effects web can be incrementally amplified through dynamic reconfiguration, incorporating both conventional and non-standard combinations of capabilities (Eckstein, 2016). Ultimately, spreading out effects in more numerous and more straightforward supporting systems enables the implementation of redundancy for response to threats, enabling decision superiority.

A capability life cycle perspective could further enhance adaptability while also developing Australia's sovereign military and industrial capabilities. Strengthening Australia's military and industrial capabilities is a critical development area for securing national interests (Houston & Smith, 2023). A capability life cycle perspective prioritises the anticipated through–life evolution of systems. It focuses on the continuous development and innovation of capabilities depending on which effects are prioritised. To answer this question, Defence must embrace emerging technological capabilities to enhance and deliver projected impacts over time. This development presents a potential for burden-sharing of development among the ADF and its allies and partners. This type of sharing offers the dual benefits of boosting capacity and lowering costs (Clark et al., 2020).

Technology alone is unlikely to establish an enduring military advantage. Employing nascent technologies within existing operational concepts limits the technology to the imagination of yesterday's military thinkers, and proliferation allows foes to achieve comparable innovations (Stillion & Clark, 2015). This evaluation of the adoption of mosaic warfare has demonstrated how the combination of emerging technology and concepts can be implemented all at once to secure a long-term, asymmetric advantage as part of a strategy of deterrence through denial.

5. Conclusion

The ADF must consider the practical applications of mosaic warfare as it faces an increasingly complex and volatile security environment, particularly in the Indo-Pacific region. The pacing threat posed by adverse actors within the Indo-Pacific necessitates a revaluation of the ADF's current force posture, structure and capabilities. This paper has rigorously examined the potential applicability of mosaic warfare principles to the ADF's future integrated force, focusing on decision superiority, disaggregation of forces and adaptability of response. The findings suggest that adopting mosaic warfare could significantly enhance the ADF's ability to achieve a credible deterrence posture through denial.

Defence is continually faced with the challenge of needing to generate credible deterrence against regional superpowers. The ADF's current force structure must be equipped to meet the challenges posed by the rapid military modernisation and increasingly assertive behaviour as seen in the Indo-Pacific. The principles of mosaic warfare offer a conceptual framework that aligns well with the ADF's emerging operational concepts and capabilities, thereby providing a pathway to a more credible and effective deterrence posture.

The ADF must prioritise actions to adopt mosaic warfare to achieve credible denial. First, the ADF should accelerate its transition from monolithic, platform-centric structures to more flexible, distributed and composable systems. This would require reorienting defence procurement strategies and a commitment to rapid capability development. Second, the ADF should invest in developing sociotechnical systems that enhance decision-making and operational flexibility. Finally, a comprehensive review should be undertaken to align the ADF's existing and future force structure with the principles of mosaic warfare, ensuring that Australia can effectively deter and, if necessary, defeat acts of aggression in an increasingly contested security environment.

This paper is a foundational step in rethinking Australia's Defence strategy and force structure, advocating for a paradigm shift towards mosaic warfare to secure a long-term, asymmetric advantage in a rapidly evolving geopolitical landscape.

Submitted: November 18, 2023 AEDT, Accepted: May 31, 2024 AEDT

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