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

Stott, N., Pendlebury, J., & Tracey, P. (2025). Organising Military Innovation: Collaborative Opportunities for Organisational and Military Innovation Scholars. *Contemporary Issues in Air and Space Power*, *3*(1), bp51817458.
https://doi.org/10.58930/bp51817458

Technology & Innovation

Organising Military Innovation: Collaborative Opportunities for Organisational and Military Innovation Scholars

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Keywords: Military innovation, Idea work, Organisational work, Inter-organisational work, Military innovation complex

https://doi.org/10.58930/bp51817458

Vol. 3, Issue 1, 2025

This paper outlines a rationale for more engagement between military innovation and organisational scholars. The paper highlights the 'blind spots' in organisational scholarship when compared with military innovation literature from other fields. It introduces the term 'military-innovation complex' to denote the increasingly opaque interaction of military, state, academic and commercial actors, and provides a framework of innovation work comprising three processes: idea work, organisational work and inter-organisational work. The paper argues these processes bridge the existing literatures and, in doing so, identifies themes in military innovation studies that resonate with current discourses in organisational theory and highlights areas for future research and collaboration.

1. Introduction

Military innovation scholars have explored the complex relationships between military ideas, organisations and technology over time (Ford, 2017; McNeill, 1982; Posen, 1984). A strength of the literature on military innovation is its historical focus on how innovation is generated and resisted in military organisational fields that encompass the public, private and social sectors. Military innovation has been characterised as: the battleground between state, industry and military leaders (Posen, 1984); stemming from experiences of actual battle (Farrell et al., 2013); or inter-service (Sapolsky, 1972) and intra-service cooperation and rivalry (Bacevich, 1986). Others have focused on culture (Adamsky, 2010) and organisational learning (Fox, 2017) as sources of innovation. Yet others have explored power relations between and within organisations (Ford, 2017) and how organisations enable or restrict open collaborative innovation (Cronin, 2020; Kollars, 2017b).

Ideas and practices of management have travelled between corporate, government and military organisations (McCann, 2017), with the military field a key source 'for models, analogies and metaphors' as organisation theory developed (Mutch, 2006, p. 752). There is less movement of *ideas* in the other direction, but evidence of military organisation adoption of management and business practices, or tools, is evident in key strategic documents such as the Australian Defence Force's (ADF) *Defence Corporate Plan* and associated 'outcomes', 'activities' and 'performance measures' (Department of Defence, 2025).

The contemporary organisational literature tends to sidestep the military (Bloomfield et al., 2017, p. 442). Notable exceptions include work on aircraft carriers (Weick, 1987), covert organisations (Shapiro, 2013), war trauma (De Rond & Lok, 2016), sensemaking[1] (De Graaff et al., 2019) and military doctors (De Rond, 2017). Some have used a historical approach to look at intelligence (Grey, 2012), the arms industry (Vergne, 2012) and groupthink (Ahlstrom & Wang, 2009). Such work tends to use military organisations as isolated empirical contexts rather than theorising the field as a whole.

This paper draws attention to the opportunities for, and importance of, theorising the management of military innovation. For instance, militaries provide ample opportunities to extend our understanding of sensemaking (Maitlis & Christianson, 2014), creativity (Thompson, 2018), organisational learning (Argote & Miron-Spektor, 2011) and socio-materiality (Carlile et al., 2013). The military context offers an understanding of innovation in extreme conditions, including intense time, environmental and political pressures. It also offers opportunities to address phenomena left out of the organisational literature, such as resistance, failure, de-adoption (Godin & Vinck, 2017) and 'social exits' (Stott, Tracey, et al., 2025).

Increased attention to military innovation is important as it has a far-reaching impact on organisations and society as a whole (McNeill, 1982; Posen, 1984). Military innovation increasingly absorbs the capacity of researchers, entrepreneurs and commercial organisations. From neuroscience

1 De Graaff et al describe 'sensemaking' as the process through which individuals analyse 'what is going on' and how to respond when faced with ambiguous or new circumstances (De Graaff et al., 2019).

to literature, academia is not immune to the military's 'encompassing tendencies' (Goffman, 1968, p. 15). While fewer people may serve in the military, more now serve the military in lethal innovation work, knowingly or not. The paper argues that the symbiotic relationship between universities, industries, entrepreneurship, governments and the military – the military-innovation complex – sits in the 'blind spot' of organisational scholars and deserves greater scrutiny.

The paper is organised as follows. First, we provide an overview of military innovation, outlining the rise of a 'military-innovation complex', which includes academia, to illustrate how it has shaped innovation management more broadly. We draw on examples from the United States (US), which tends to dominate the military innovation literature, charting the scope and breadth of military innovation studies. We then develop a framework for analysing military innovation comprising three processes: idea work, organisational work and inter-organisational work. We aim to bridge the gaps between the existing literature and our framework and provide inspiration for further collaboration between disciplines.

2. Why do militaries innovate?

Military innovation involves the creation, implementation and diffusion of ideas; organisational forms; and technology to deliver competent and coherent violence: the ability to sustain lethality in the face of the chaos of combat. Organised violence is hard to achieve even for militaries that perceive themselves as well trained, with coherent doctrine and state of the art equipment (Collins, 2009b). As Carl von Clausewitz observed, '[e]verything in war is very simple, but the simplest thing is difficult' (Clausewitz, 1832/2007, p. 65). Human frailty, incomplete knowledge, and the opposition's agency in disrupting the best laid plans all contribute to the chaos of conflict and 'incompetent violence' (Collins, 2009b). When faced with violence we experience an inhibitor, 'confrontational tension/fear', which makes actual violence difficult, ineffective and therefore incompetent (Collins, 2009a, p. 568). Competent violence depends on circumventing fear through emotional control and distance from human targets (Ben-Ari, 1998; Collins, 2009a).

The primary aim of military organisation is to achieve competent, coherent violence. This means militaries need to navigate through 'order and chaos'; a rational organisation attempting to order an irrational environment (Winslow, 2007, p. 84). Order is enforced by hierarchy, discipline and uniformity. Chaos is the violence, sensory overload and fear. In this context, innovation entails fusing ideas (about how to do combat, which is expressed as doctrine), organisational forms, technology and the resilience of military personnel.

3. Organising military innovation

Military innovation involves an opaque web of military, industry and academia, often characterised as the 'military-industrial complex' (Eisenhower, 1961). Or, as we suggest, a 21st century version, the 'military-innovation complex', which now involves entrepreneurs, incubators and innovation ecosystems such as Silicon Valley.

Military organisations frequently graft 'best' practices emerging from research to their ideation, education, and structural forms and operations (although not necessarily successfully). Military research agencies draw from universities for their military utility often through 'innovation/entrepreneurial clusters', thereby framing innovation (Stott, 2025). From neuroscience, robotics and nanotechnology to textiles, food and plant technologies, and semantics, university-based innovators may be unaware of the military applications of their work (Stott, 2025). For critics, the military's 'encompassing tendencies' (Goffman, 1968) are evidence of the inappropriate accumulation of military power and the militarisation (or weaponisation) of ideas, people and things. Whether utilising innovations generated indirectly (civilian) or directly (military procurement) – marked by an increasingly indistinct line – the result is often a 'symbiotic relationship', which intensifies militarisation (McNeill, 1982, p. vii; Stott, 2025).

3.1. The rise of the US military-innovation complex

The US has created a vast research network which is 'public and private, secret and open, working on every frontier trying to build better weapons' (Gholz & Sapolsky, 2018, p. 4). The US has developed think tanks, military universities and research centres. The US has moved gradually from the top-down 'Developmental Bureaucratic State' (DBS) – the military-industrial complex of World War II and the early Cold War – to a decentralised innovation ecosystem of the 'Developmental Network State' (DNS) (Block, 2008), which we label the 'military-innovation complex'.

A key example is the pioneering Defence Advanced Research Projects Agency (DARPA), which, since 1958, has made 'the future happen', transforming industry and society (Jacobsen, 2015, p. 7). Its program managers act as 'entrepreneurial leaders' orchestrating research projects in the US and beyond (Jacobsen, 2015). The core methods, pioneered by DARPA, are 'targeted resources', 'opening windows', 'brokering' and 'facilitation' (Block, 2008). 'Targeted resources' aims to accelerate progress by concentrating resources – modelled after the Manhattan Project, which created the first atomic bombs. In contrast, 'opening windows' encourages numerous actors to innovate, not just the national laboratories, top universities or the major defence corporations. In doing so, DARPA piloted incubation, shared facilities and 'open innovation'. 'Brokering' refers to making connections and encouraging joint work, as well as business brokering to support commercialisation. 'Facilitation' involves collaborations within government to remove or circumvent obstacles to innovation (Block, 2008). In effect, DARPA, by focusing on 'high risk in pursuit of high payoff', 'de-risks' technology for private investment (DARPA, 2025).

DARPA has coordinated innovations which have transformed militaries and society, such as the internet, GPS, stealth technology and drones. It has prefigured technol-

ogy, as demonstrated by its autonomous vehicle research in the 1980s. It has also caused untold damage, for example, with the defoliant Agent Orange, used in Vietnam. DARPA drives a cycle of innovation, attempting to stay one step ahead, as 'competitors' emulate technology (see Jacobsen [2015] and Weinberger [2017] for histories of DARPA). Lauded as an exemplar of public sector innovation, DARPA pioneered modern innovation systems and its methods were emulated by other governments (Block, 2016). What we know of DARPA's current work on autonomous weapons, robotics and bio-augmentation presents numerous ethical dilemmas and far-reaching implications (Scharre, 2018). Many projects are classified, and 10 to 20 years ahead of public domain technology (Jacobsen, 2015).

DARPA is not alone. For instance, the Defense Innovation Unit (DIU), Central Intelligence Agency's In-Q-Tel (established in 1999), and the Defense Innovation Board (DIB) are instrumental in the military-innovation complex (Defense Innovation Board, n.d.). The DIU invests in Artificial Intelligence (AI), autonomous systems, information technology, space and biomedical companies. In-Q-Tel was the first government-sponsored 'non-profit' venture capital firm. It has invested in intelligence-related fields such as data, imaging, voice recognition and DNA analysis, particularly in Silicon Valley (Keller, 2015; Szoldra, 2016). The DIB brings together leaders from companies like Instagram and Google as well as academia such as the Wharton Business School, Duke University and California Institute of Technology to advise on culture, technology and practice.

The DNS is decentralised, encourages duplication and 'built in redundancy', and encompasses academia, commercial and state organisations (Block, 2016). Unlike the command model of the DBS, the DNS is 'far less visible to journalists, scholars and the public' (Block, 2008, p. 174). The US innovation system has moved beyond the big 'defence-unique' suppliers to encompass a vast range of other actors to exploit the cutting-edge research and technologies of the global commercial sector (Simón, 2016). That said, the big defence companies – such as Lockheed Martin, Boeing and BAE Systems – still play a key role in integrating entrepreneurs' and research institutions' innovations into military products (Gholz & Sapolsky, 2018).

In the military-innovation complex, we now have 'metagovernance': 'a plurality of processes that connects government with private and voluntary actors in networks and partnerships, and the point of metagovernance is governance of these interactions' (Christiansson, 2018, p. 266). For instance, in 2017 the US Air Force (USAF) established a community of air force innovators – AFWERX – to be a catalyst for 'engagement across industry, academia and non-traditional contributors to create transformative opportunities and foster an Air Force culture of innovation' (United States Air Force, 2018)). Through metagovernance, a military-innovation complex has emerged in which it is increasingly challenging to disentangle the civil from the military. A global process, the US military-innovation complex draws on entrepreneurship and innovation from across the world. As Russia and China strive to emulate the US, they have developed their own far-reaching military-innovation complexes (Bitzinger & Raska, 2022; Cheung, 2011; Kania, 2019).

3.2. Encompassing academics

Militaries have long incorporated and encompassed academia, with the reach extending well beyond the close connections typified by the military academies that offer new recruits a liberal education in parallel to basic officer training. From the mid-20th century, scholars became embroiled in military innovation through substantial research grants, academic positions and contracts (Rohde, 2013). In 1950, the US Navy and Central Intelligence Agency (CIA) funded Project Troy at the Massachusetts Institute of Technology (MIT) to develop psychological warfare tactics. Project Troy became a model for large scale military/academic collaboration. For many social scientists, military projects became 'integral to their day to day work' (Simpson, 1998, p. xxi).

In 1961, President Dwight D. Eisenhower famously warned against the rise of the military-industrial complex. He defined it as a powerful network of public and private forces that combine a profit motive with the planning and implementation of strategic policy, potentially threatening democracy (Ledbetter, 2011, p. 6). In a draft of his 1961 speech, Eisenhower used the term 'military-industrial-academic complex' reflecting academia's role (Giroux, 2016). Despite his caution, Eisenhower's 1958 National Defense Education Act (NDEA) underwrote university support for the Cold War effort (Mosser, 2010), involving new fields of learning such as computer science, primatology and paleoanthropology (Engerman, 2003). Military expenditure underwrote research projects by social scientists such as Margaret Mead (Wolfe, 2018), and centres like Talcott Parsons' Harvard Department for Social Relations (Patterson, 2001). Indirectly, research which, on the surface, would appear to have no military utility, was encompassed by the military-industrial complex (Bridger, 2015; DeGrasse Tyson & Lang, 2018; Rohde, 2013; Wang, 1999).

The RAND Corporation, in addition to DARPA, is another major research organisation that has been instrumental in incorporating academics into military innovation. Project RAND (Research and Development) was established in 1945 to maintain the wartime links between the USAF and civilian scientists. With a small number of 'deviant thinkers drawn from multiple disciplines, RAND became a major source of ideas' (Augier et al., 2015, p. 1142). It was a template for incubating innovation within the military, and for think-tanks in general (Abella, 2009). In 1948, it launched a social science arm and became a non-profit corporation with trustees drawn from politics, industry and universities. RAND has 'literally reshaped the modern world - and very few know it' (Abella, 2009, p. 3). The most influential ideas resulting from RAND's activities include game theory, organisational economics, nuclear strategy, evolutionary economics and rational choice theory.

After the Vietnam War, many US universities ostensibly severed their military links. However, they shifted to research contractors (often classed as 'non-profits') that had opaque relationships with universities and the military. For

instance, the US Army's much maligned Centre for Research on Social Systems at the American University quietly transferred staff into the non-profit American Institutes for Research (Rohde, 2013). More recently, much of the late Cold War military innovation focused on the so-called 'Revolution in Military Affairs' (RMA) (Freedman, 1998; Shimko, 2010). Alarmed the Warsaw Pact could field three times more troops and equipment than NATO, the US developed a second 'offset strategy' in the mid-1970s, focusing on lethality through high technology (Freedman, 1998). Again, research grants and contracts flowed into universities, largely without the critical attention seen in the Vietnam era.

Post 9/11, investment in social sciences intensified. The occupation of Iraq led to a shift (in the West at least) from the RMA to counter-insurgency. It also led to innovation in systems integration and targeting (Lindsay, 2020). For instance, despite recent cuts in funding under the second Trump administration, the Pentagon's Minerva Initiative continues in its aim to 'leverage the intellectual horsepower of the American academy' in social sciences (Kupferschmidt, 2025; Mosser, 2010, p. 1081). Contentious innovations which embroiled social scientists – anthropologists in particular – included contract research on cultural understanding or 'human terrain' as well as embedded Human Terrain Teams (HTT) in Iraq and Afghanistan (Gusterson, 2017) and the privatisation of military services (Singer, 2008). HTTs led to the rise of the subdiscipline of military anthropology and associated academic posts within military universities (González, 2009) and were immensely controversial within the anthropology community (González, 2018).

Calls for academic input include the US Army's 'Mad Scientist Initiative', which, for 30 years brought military, corporate and academic communities together in 'problem solving within the far future of Armed Conflict' (United States Army, n.d.)[2]. Other calls have included themes such as mega-cities and bio-convergence, as well as for science-fiction stories (Shabro & Winer, 2017). In 'Visioning the Future of Warfare 2030-2050' through 'the art of storytelling, the Army was able to visualize the known, probable, and possible challenges and opportunities that the future holds' (Shabro & Winer, 2017). DARPA is also now collaborating on an AI system to assess the utility of social research – SCORE (Systematizing Confidence in Open Research and Evidence) with the Center for Open Science in Virginia (Resnick, 2019).

In summary, academic involvement in military innovation has become more diffuse, with multiple points of convergence, and more opaque relationships between military framing and application of scholarship.

4. Studying military innovation

Traditionally, military innovation scholarship has been the preserve of scholars whose disciplinary allegiances lie within international relations and history: strategic, security or war studies, and military history in particular. A small cadre of military sociologists and military anthropologists also contribute to the discipline. Military innovation scholars focus on how innovation impacts strategic and operational practice – its scope and scale and resulting effectiveness – with combat being the ultimate audit (Rosen, 1994). Explanatory models examine the interplay of the state and military, intra- and inter-service dynamics and culture (Grissom, 2006). We summarise the key debates in **Table 1**.

Military innovation scholars tend to be closely positioned within political and military organisations (Grey, 2009), such as think-tanks and professional military colleges. Many have 'unparalleled access' to some of the largest organisations in the world, their archives and partner organisations (Griffin, 2017, p. 198). Insider status presents opportunities, but can also be problematic (Pendlebury, 2019). Vested interests, close organisational allegiances, and research funding which privileges practical utility, create a 'theoretical conservatism biased towards applied research' (Griffin, 2017, p. 206). But a question we need to ask is 'what is that research applied to?' Military innovation scholars are not immune from Clegg's criticism of organisational studies: in 'designing a better machine in the interests of those it serves rather than those it damages' (Clegg, 2009, p. 344).

Organisational scholarship tends to focus on particular high-technology industries (Salter & Alexy, 2014), which has opened the 'black box' of managing innovation in the private sector (Phillips, 2014). We suggest that military innovation management could present the next 'black box' for organisational scholars. Military innovation literature on conflict and power also offers valuable insights into innovation management, an area largely overlooked by organisational scholars.

The military innovation literature sets out rich, historical case studies that provide transferable insights into organisational identity, change, learning, power, inter-organisational work and failure (see **Table 1**). Also, military innovation studies explore the interplay of ideas, organisations, and service innovation (Jensen, 2016; Salter & Alexy, 2014). Furthermore, it provides sophisticated accounts of the role of power and politics in innovation, including in multi-national settings. In turn, organisational scholarship can assist Griffin's (2017) call for greater theoretical ambition in military innovation studies, and more critical research and greater engagement with organisational scholars. However, the insights from the literature have rarely been aligned.

2 The Mad Scientist All Partners Access Network (APAN) was decommissioned in October 2025.

4.1. A framework of military innovation work and opportunities for research collaboration

In the following section, we discuss a framework involving three levels of analysis in which debates around military innovation can be situated. The three levels are: idea, organisational and inter-organisational work (**Table 1**). Considering these activities as work acknowledges the agency of actors involved, since the work undertaken by individual and collective actors creates, maintains or disrupts innovation. Here, we align the key debates in military innovation scholarship and organisational studies. By distinguishing these three strands of practice and the relationships between them, we can compare the corresponding debates in military and organisational scholarship. In this section, we also briefly consider future research opportunities, identifying themes of mutual interest.

4.1.1. Idea work

Idea work is the process of generating or resisting ideas (Carlsen et al., 2012). In military innovation, this pertains to ideas on the nature, past and future of war, 'visualizing new ways of war' (Jensen, 2016, p. 15) and 'new theories of victory' (p. 22). Military innovation scholarship is concerned with the propagation of such ideas which lead to the development of new operating concepts and, eventually, doctrinal change. Military idea work is facilitated by safe incubation sites (such as staff colleges, professional journals and 'strategy blogs') to debate ideas and advocacy networks to promote them.

Military innovation has traditionally been a top-down process, performed by senior officers or civilians (Ford, 2017). For example, the German 'blitzkrieg' ('lightning war'), a method combining a spearhead manoeuvre with mechanised infantry that was devised during the invasion of France in 1940, relied on top-down command models. More recently, the experiences of counterinsurgency in Vietnam, Iraq and Afghanistan have led to 'bottom-up' approaches, such as adaptation (Farrell et al., 2013; Neads et al., 2023; Russell, 2011) and organisational learning for military effectiveness (Nagl, 2005), or 'organisational learning under fire' (Carley & Harrald, 1997). Even so, the ability of bottom-up change to produce scalable innovations remains contested (Ford, 2017). A further iteration of military innovation is the approach of middle-out (Ford, 2017), or horizontal innovation (Foley, 2012), in which the engine for organisational change lies in the middle structures of the armed forces (Pendlebury et al., 2025).

While military innovation scholars have sought to understand how ideas are propagated – that is, bottom-up, top-down or middle-out – organisational scholars are more likely to focus on the nature of ideas and how they are generated. One area in which we see the most potential for greater mutual interest is 'user innovation' – the participation of user organisations or end users in developing products or services (Von Hippel, 2005). Further exploration of this in military contexts could prove fruitful, because it offers an understanding of the 'micro-processes' involved in generating ideas; that is, processes on the scale of individuals, teams or lower-level units. User innovation may seem to be antithetical to a military environment. Yet, there is a long history of innovation by 'mavericks' and clusters of relatively junior officers. For instance, Jensen (2016) documents the 'micropolitics of innovation', explaining how, in Iraq, the sustained advocacy work of officers – who had direct experience of organisational failure to adapt in the field – coupled with the positional legitimacy of general officers converted to the idea, brought about innovations in counterinsurgency approaches. Recent examples of innovation in the field by the Ukrainian Army, particularly through leveraging the use of cheap and plentiful drone capabilities, demonstrates the power of tactical and operational level innovation, even in the face of overwhelming conventional military power (Halem, 2023). These studies raise questions about when, and under what circumstances, military organisations suppress, tolerate or encourage user innovation.

Intriguingly, 'bootleg' innovation – user innovation undertaken with no formal organisational support, but to benefit the organisation (Criscuolo et al., 2014) – also occurs in a military context. Rigid planning processes are not conducive to the need to rapidly solve 'everyday' problems, especially in combat. Grassroots military bootlegging occurs when initiative or bottom-up feedback mechanisms are constrained, particularly when existing solutions do not work in extreme and unpredictable situations. In an organisation which privileges standardisation and consistency (Hill, 2015), bootlegging may provide a 'sanity check' or safety valve. For example, bootleg innovation can solve low-level procurement niggles or equipment or process failure. But the question remains as to whether it can lead to lasting or scalable innovation. Because of the extreme circumstances in which military bootlegging occurs, further collaborative research could improve our shared understanding of the micro-processes and impact of unsanctioned idea work.

4.1.2. Organisational work

We define this work as the process of organisational action to deliver or resist innovation. Innovation can also be studied at the organisational level, and while much of the military literature has focused on top-down examples, more recent scholarship has examined distributed innovation processes, military culture and organisational learning. How organisations assimilate new learning (exploration) and use it (exploitation), in other words, moving from intuition to institutionalisation, affects their performance and sustainability (Crossan et al., 1999; Vera & Crossan, 2004). Organisational learning has become central to military scholarship debates as militaries that do not learn, or cannot integrate learning rapidly enough in combat, tend to suffer.

Military scholarship has focused on themes overlooked in organisational studies, such as implementation and diffusion/adoption (Dias & Ferreira, 2019). Also, power and politics are integral to military studies, but neglected in organisational learning scholarship, which has a 'consensual and conflict-free flavour' (Easterby-Smith et al., 2000, p. 794). Gender, race and LGBTQIA+ politics, policy and prac-

Table 1. A framework of military innovation work

	Idea work	Organisational work	Inter-organisational work
Definition in relation to innovation	The process of generating or resisting ideas on innovation.	The process of organisational action to deliver or resist innovation.	The process of inter-organisational action to deliver or resist innovation.
Example	First World War British Army doctrine development and sharing (Fox, 2017); Human Resource Teams (McFate, 2018); UK Defence Medical Services (Ford et al., 2017);	The Pentomic Division (Bacevich, 1986); US counterinsurgency doctrine (Nagl, 2005)	Armoured Fighting Vehicles: Bradley/Abrams (Haworth, 1999); Artificial intelligence (Webb, 2019); B-1 bomber (Farrell, 1993); 'Five Eyes' intelligence and technology sharing (Defence Science and Technology Group, 2025); M-16 rifle (McNaugher, 1984);
Key debates in military innovation literature	**Bottom-up innovation:** as adaptation from below (Farrell et al., 2013; Farrell & Terriff, 2002; Russell, 2011) **Middle out/Horizontal innovation:** exchanging best practice between units (Foley, 2012) change originating from the middle of the military-innovation complex (Ford, 2017) **Innovation as a matter of organisational learning:** learning 'under fire' (Carley & Harrald, 1997) **Improving military effectiveness through organisational learning:** (Catignani, 2012; Fox, 2017; Nagl, 2005) **Innovation as a social construct:** (Bousquet, 2009; Ford, 2017, 2019; MacKenzie, 1990; McNaugher, 1984)	**Top-down innovation:** as a result of military leadership (Posen, 1984) through intra-service rivalry/ cooperation (Bacevich, 1986; Rosen, 1994) as a result of limited resource allocation and intra-service rivalry (Sapolsky, 1972) **Distributed innovation:** (Morris, 2017) how technologies diffuse and affect patterns of innovation (Ford & Gould, 2018; Horowitz, 2010) **Innovation as a matter of organisational learning/memory:** as organisational learning (Dyson, 2019; Hasselbladh & Ydén, 2020; Nagl, 2005) as organisational memory (Hardt, 2018) **Innovation as a matter of military culture:** as a cultural phenomenon (Adamsky, 2010) as the product of doctrine and culture (Kier, 1997) as cultural predisposition (Farrell & Terriff, 2002; Mahnken, 2002) as mastery (Kollars, 2017a)	**Top-down innovation:** as a result of government /civilian and military leadership (Posen, 1984) through inter-service rivalry/cooperation (Bacevich, 1986; Rosen, 1994) as a result of limited resource allocation and inter-service rivalry (Sapolsky, 1972) as a response to threats (Evangelista, 1988) **Innovation as a middle-out and an outside-in process:** as a matter of power relations between and within organisations/constituencies (Ford, 2017; Ford et al., 2017) 'open innovation' (Kollars, 2014, 2017b) **Innovation through technology diffusion between nations/states:** how technologies diffuse and affect patterns of innovation (Ford & Gould, 2018; Horowitz, 2010) **Innovation as resistance to industry or empowered by industry:** bureaucracies unable to change so encourage market solutions (Dombrowski & Gholz, 2006) industry unwilling to innovate so they 'gold plate' (Kaldor, 1982; McNaugher, 1989)
Parallel debates in organisat-ional literature	Creativity (Thompson, 2018) Emotions (Zietsma et al., 2019) Organisational learning (Argote & Miron-Spektor, 2011) Sensemaking (Maitlis & Christianson, 2014) Socio-materiality (Carlile et al., 2013) User innovation (Von Hippel, 1986, 2005)	Emotions (Zietsma et al., 2019) Legitimacy (Suddaby et al., 2017) Organisational learning (Argote & Miron-Spektor, 2011)	Cross-sector partnerships (Gray & Purdy, 2018) Cross-sector work (Vurro et al., 2010) Emotions (Zietsma et al., 2019) Inter-organisational relations (Cropper et al., 2008) Legitimacy (Suddaby et al., 2017)

tice have also received extensive academic consideration (see Caforio & Nuciari, 2018), whereas the organisational learning literature often considers politics a 'perversion or a "necessary" dysfunction or evil within organisations' (Easterby-Smith et al., 2000, p. 793), and are therefore relatively silent on key vehicles of power, such as race, gender, class and sexuality (Devos, 1996; Martin et al., 2018; Teller, 2022).

A key debate in the literature is whether military leadership and bureaucracies facilitate or hinder learning. For Hasselbladh and Ydén (2020), military organisations 'are attuned to *reproduce sameness*': predictability, control and codification are emphasised and learning is often the outcome of retrospective sensemaking (Hasselbladh & Ydén, 2020, p. 489). Dyson (2019) distinguishes between informal and formal military learning, with the former disseminated through informal networks and focusing on ad hoc and short-term problem solving, such as in user innovation. Meanwhile, the latter focuses on creating organisational structures and processes to identify, manage and implement lessons (Dyson, 2019). For example, the study by Morris (2017) of US strategic bombing theory in World War II explains how the strategies took root gradually – with no clear single catalyst – as a distributed phenomenon within a highly bureaucratic environment. This involved persuasion, experimentation, demonstration and significant infighting.

Military innovation scholarship has explored decentralised learning and connects with organisational literature – in particular, literature on 'communities of practice', 'activity systems' and 'ecologies of knowledges' (Easterby-Smith et al., 2000, p. 788). For instance, Jensen (2016) explores advocacy groups, and Fox (2017) explores networked learning: 'the interconnectedness between top-down, bottom-up, incidental, and horizontal approaches' (Fox, 2017, p. 7).

Dyson calls for comparative scholarship on organisations operating in a 'High-Velocity and Turbulent Environment' involving 'high-risk, complex and rapidly-changing contexts' such as fire, health, police, nuclear industry and railways (2019, p. 123-24). Decades of organisational work during recent wars have arguably made the US forces as, if not more, agile and adaptive than leading private companies (Russell, 2011). Exploring organisational work in extreme situations, such as the military, could improve our collective understanding of innovation within 'high reliability organisations' (Weick et al., 1999).[3] However, questions remain. How are military organisations creating space for more decentralised and collaborative organisational learning? How do military organisations manage the tension between innovation and continuity? How do they learn under duress?

Organisations that operate in the 'shadows' could be a valuable area for further research. Scott (2013) suggests organisations operate in a continuum from transparent to shaded, shadowed and dark. The degree of visibility is linked to audience, membership, law and regulation as well as the degree of legitimacy or stigma associated with the organisational form. For instance, Vergne (2012) saw the stigmatisation of the arms industry contributing to their 'relative isolation from the rest of society, thereby turning secrecy and discreetness into assets' (Vergne, 2012, p. 1047). Such organisations tend to be poorly understood and in 'greatest need of empirical study' (Scott, 2015, p. 505).

4.1.3. Inter-organisational work

Innovation, at the level of inter-organisational work, involves action between multiple organisations to deliver or resist ideas. This is of particular importance in military innovation, due to the complex and high stakes nature of warfare. There is a normative rhetoric (Selsky & Parker, 2010, p. 22) that 'grand challenges'[4] require collaboration, but inter-organisational work is often prone to conflict (Ashraf et al., 2017; Crosby & Bryson, 2010). Military inter-organisational work appears to be less prone and often presents interesting examples of successful cooperation under pressure. For example, DARPA created 'collaborations between heterogeneous actors who hail from different fields or who hold radically different world views' (Hampel et al., 2017, p. 575). Additionally, multinational commands, such as NATO, have successfully fought wars and achieved collective objectives (King, 2019). There have been extensive studies of state command (the DBS) and the interaction between prime defence contractors and universities in earlier phases of military innovation work (see Baime, 2014; Edgerton, 2005; Gansler, 2011; Sparrow, 2011). These analyses of inter-organisational work are rarely referenced in non-military organisational studies.

The practices of military inter-organisational work resonate with the burgeoning literature on inter-organisational relations (Cropper et al., 2008) and cross-sector work, 'the new organisational Zeitgeist' (Vurro et al., 2010, p. 40). Increasingly, lone organisations (or sectors) lack the competence or resources to tackle 'grand challenges'. Inter-organisational work is undertaken by 'autonomous actors' who construct shared rules, norms and structures to tackle issues of mutual concern (Gray & Purdy, 2018). New forms of organising have arisen 'in response to changing conditions within institutional fields' (Gray & Purdy, 2018,

3 Weick (1987) and Weick et al. (1999) make the important distinction between high *efficiency* and high *reliability*. In this literature, efficiency represents the more 'conventional organisational issue', driving organisational behaviours toward the generation of value and profit maximisation. Conversely, 'high reliability organisations' place greater emphasis on reducing operational errors. Classic examples of high reliability organisations include those involved in aviation, space travel, nuclear reactor management and oil rigs (Weick, 1987).

4 We define a 'grand challenge' as one for which there is no single identifiable causal factor, and for which no single actor possesses the resources or understanding to solve it. Climate change is an example of a contemporary grand challenge.

p. 36). Such 'boundary spanning' work has become legitimised (Kislov et al., 2017).

Even though inter-organisational work is portrayed as the future for organising (Gray & Purdy, 2018), the literature has struggled to move beyond simple proscriptions and checklists. A better understanding of military inter-organisational work could contribute to organisational theory, offering insights relevant to other fields.

Militaries obsess over, and plan for, numerous threats – internal and external – including climate-induced conflict. Until recently, the US Department of Defense long perceived climate change as a present security threat (Bierman, 2025), not purely a long-term risk which will 'disproportionately affect fragile and conflict-affected states' (Department of Defense, 2015, p. 14). While war between 'big' states for resources is an ever-present danger, in the short term at least, access to water (potable and agricultural), food and climate migration are likely to compound existing tensions (Kurth et al., 2024; Stott, Pendlebury, et al., 2025; Welzer, 2008/2012). Climate 'events' will require humanitarian relief and inter-organisational work at a scale and intensity rarely experienced outside war. Understanding how military organisations plan and implement inter-organisational humanitarian relief will be crucial to responding to such crises. Important lessons can be derived from researching the numerous inter-state organisations (past and present) which focus on the preparation, deterrence or execution of combat, such as NATO and US strategic and unified combatant commands. Such organisations appear to overcome barriers and evolve processes and products for interoperability and complex metagovernance.

Etzion and Gehman (2019) recently urged organisational scholars to 'show up' and engage with the 'big, important, real world issues and [participating] in devising thoughtful, meaningful ways to deal with them' (Etzion & Gehman, 2019, p. 489). Avoiding war, driven by climate change or escalating competition between big states, is such an issue. While military innovation work provides numerous insights, it is also problematic. War is a progenitor of innovation. The perpetual wars in Iraq and Afghanistan have intensified the military's encompassing tendencies and blurred the civil-military relationship. There is extensive literature that addresses 'the civil–military problematique: how to make the military an effective defender of the state without also making the military a capable threat to the state' (Feaver, 2017, p. 326). However, this literature overlooks the democratic consequences of military-innovation complexes, as well as the threat posed by military innovation in setting academic and entrepreneurial wheels in motion. Solving scientific, technological or entrepreneurial puzzles in quantum, nanotechnology, robotics and AI, as well as expanding our social and cultural understanding, can lead to new ways of warfare, and accelerate subsequent arms races. Given the deadly consequences of military innovation work, it is time that organisational scholars reflect on the relationships between academia and military organisations. They must 'show up' and not avoid 'unsettling' research contexts (Claus et al., 2019).

5. Conclusion

Further study of 'idea work' and 'organisational work' in the extreme and high-stakes contexts of the military can offer important insights for researchers seeking to understand innovation management. This would entail bridging the fields of scholarship in military innovation and organisational theory. In this endeavour, we suggest that further study of bottom-up models of innovation, such as user innovation, could prove valuable avenues for further research for both disciplines. In the Australian context, the Royal Australian Air Force's Plan Jericho is a potential host for such a body of work, given its focus on embedding a culture of disruptive and ground-up innovation within the framework of a traditional, hierarchal military organisation (Barnes, 2018).

In addition, we assert that collaborative research into military 'inter-organisational work' is especially urgent. The nature of climate-related crises likely to assail us in the not-too-distant future means the ability of organisations to cooperate without conflict will be crucial. Inter-organisational work is the fabric of the 'military-innovation complex', which, we argue, sits in a 'blind spot' of organisational scholarship. This blind spot deserves greater attention for two key reasons: first, because the opaqueness of the relationships involved – between universities, the technology industry, commercial entrepreneurship, governments and the military – undermines effective engagement in innovation. Second, because without appropriate oversight, democratic control over this complex is rendered impossible.

Questions remain regarding how military framing, facilitation and investment shapes innovation organising, as well as the processes and practices involved. For instance, what impact do organisations like DARPA have on the culture and leadership of innovation? In what ways has private sector innovation been shaped by military agendas? Has the institutional distance (Phillips, 2014) between military and non-military organisations shrunk? If so, what are the implications for both? How does military innovation work frame, enhance or distort organisational fields? What are the tensions created by the encompassing tendencies of military innovation work and how do researchers, entrepreneurs and organisations manage such tensions?

At a more macro level, how could military innovation contribute to *reducing* the likelihood of conflict – an objective central to Australia's 'Strategy of Denial' in the *National Defence Strategy* (Commonwealth of Australia, 2024, p. 7) – rather than simply improving battlefield lethality and operational effectiveness? Put another way, how can military innovation support whole-of-government stabilising activities that deter international actors from initiating conflict? This last question warrants scrutiny as the international community grapples with geopolitical crises that have brought the globe 'the closest to global catastrophe it has ever been' (Mecklin, 2023); crises that traditional approaches to military force structures and postures seem incapable of addressing.

While the contours of military innovation work in the West are discernible with effort, much remains hidden. Most organisations manage their transparency to some extent. Military innovation still operates within dark organisations and the intensifying relationships with universities, companies and entrepreneurs are shaded or shadowed. Military innovation scholars have shed some light, not least in historic cases (Ford, 2017), but the need for more research to map the changing contours of military-innovation complexes remains.

We therefore encourage research which maps these relationships, as this can offer significant insights into how military innovation works in practice and, in doing so, contribute to a critical discourse. We hope that in providing scrutiny of the ever more invasive military-innovation complex, researchers can create greater awareness as well as strengthen democratic checks and balances.

Acknowledgements

The authors would like to thank Drs Michelle Darlington, Bill de Marco and Matthew Ford for their invaluable input to early drafts of this paper.

Submitted: August 12, 2025 AEDT. Accepted: September 02, 2025 AEDT. Published: December 11, 2025 AEDT.

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