

Contextualizing Military Design Thinking

Dr Murray Simons
Australian Defence College

Samuel Simons
Royal Australian Air Force

Design thinking is not a thing. Rather, it is better described as *many things, to many people*. In fact, to some, the associated literature can appear complex—yet here lies its beauty. The characteristics of design thinking are the same characteristics of the very phenomena it attempts to modify. Luckily, even at the entry level, it is actually quite intuitive.¹ However, the deeper one studies the concept, the more powerful it becomes.

Design thinking is an eclectic collection of sense-making approaches to amorphous, incomplete, complex, evolving, and contradictory phenomena—typically with a goal of improving the situation. It is, therefore, not surprising that the construct is in itself, indescribable in just a few words. In fact, one of the tenets of complex adaptive systems is that they are not reducible to simplified representations or component parts. Any attempt to do so, invalidates the system’s true nature. This article, therefore, acknowledges its weakness in that it proposes a visible interpretation of an amorphous concept. Reflexive purists will be horrified, but the curious might just read on.²

This paper proposes a conceptual framework for contextualizing military design thinking (MDT). It progressively explores the major zones and concepts in the much broader discipline of *general* design thinking to demystify various interpretations of a single label—in different settings, for different purposes. It then situates the multidisciplinary spectrum of design thinking and problem types before tackling the concept of design in the military. Of the six broad themes, MDT is explored in more depth. The paper concludes by drawing all the preceding constructs together into a single holistic framework of military design thinking. The value of this *Funnel Model*, is in contextualizing different uses of the label Design Thinking by demonstrating the interlinked layers and relationships of its application.

General Design Thinking

Design thinking is as diverse as it is evolving. In a general sense, the term is multilayered spanning various traditions, philosophies, paradigms, epistemologies, ontologies, and methodologies from tactical to grand strategic levels. In its simplest form, the term refers to conceiving of an object that has never been imagined before. As an early example, Leonardo da Vinci’s *saper vedere* (knowing how to see) epitomizes design thinking.³ While the well-known contrast between advertising and marketing is the promotion of an existing product versus researching what customers actually want, and then producing it for sale. Design thinking, however, goes a step further. As Henry Ford famously said, ‘If I asked people what they wanted, they would have asked for a faster horse.’⁴ Design thinking,

The authors are both serving Australian Defence Force officers who co-created the paper by considering the topic from alternate perspectives. As a recent graduate of the Australian Defence Force Academy, Sam Simons is currently posted to No 3 Squadron, the home of the Joint Strike Fighters. In contrast, Murray Simons is a seasoned faculty member of various Defence Colleges.

therefore, is typically explained as ‘The ability to imagine that-which-does-not-yet-exist, to make it appear in concrete form as a new, purposeful addition to the real world.’⁵

General design thinking transcends professions and disciplines. In fact, the overlap is so profound many universities now offer design as an interdisciplinary course of study. University schools well suited to this arrangement include architecture, engineering, information technology, business, urban planning, public policy, law,⁶ and (eventually) mainstream military colleges—among others.

Design thinking has evolved from just imagining new objects, to conceiving new thought processes and even social systems.⁷ Building on Rittel and Webber’s *wicked problems* construct,⁸ Richard Buchanan’s 1992 article expanded the concept from just *product* design to *process* design.⁹ Since then, academics have proposed further evolutions in both the focus and locus of design thinking. A simplified ontology of approaches traces the cognitive process from *Participatory* through *User-centred*; *Human-centred*, *Interaction*, *Transformation*, and onto *Service Design*.¹⁰ Each of these passing on their DNA to the next, so we now find a diverse gene pool of both mixed and purebred approaches.

Problem Types

Problems come in all shapes and sizes. Although lay practitioners use the terms *complicated* and *complex* interchangeably, the two are not even on the same axis. While a tenet of design thinking for complexity contends there is neither a definitive right approach, nor solution; it could be argued that the dynamic interplay is semantic. However, misinterpreting a complex problem (or phenomenon) as merely complicated, risks catastrophic failure. It is, therefore, prudent to briefly define problem types for the uninitiated. It is also worth noting that some problems initially appear as a certain type only to evolve into another—once again, revealing the beauty of design thinking’s *raison d’être*.

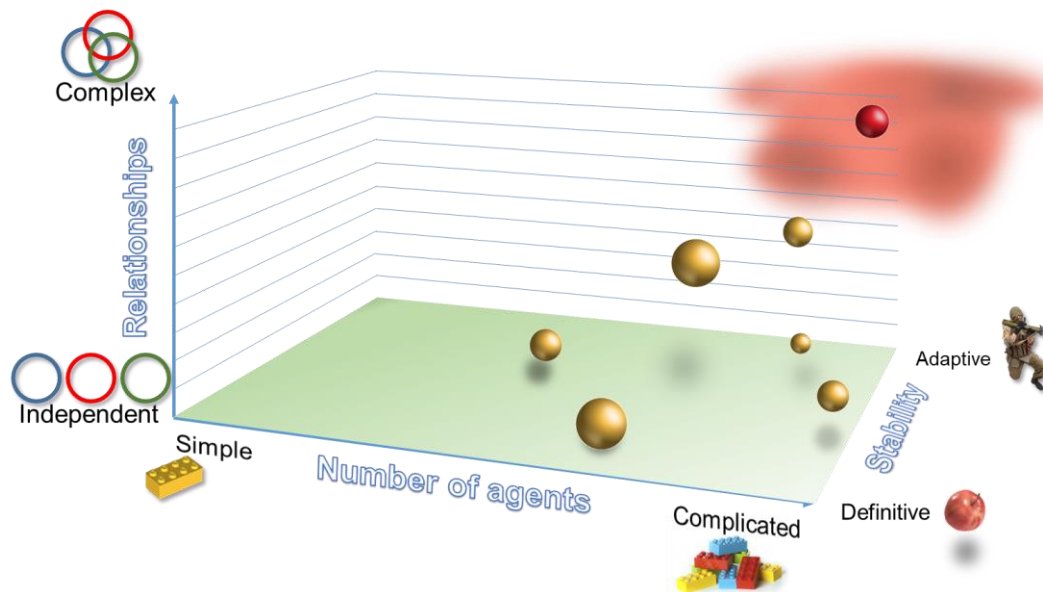


Figure 1 The three dimensions of complex adaptive systems (shown in the red amorphous cloud).

Simple, complicated, complex, and wicked problems are different (Figure 1). Simple problems have just two elements and a single solution. The more component parts, the more complicated. Loading a magazine for example is a relatively simple problem. Once fitted to a rifle, however, the increased number of parts makes the weapon slightly more complicated. Adding more component parts makes the system even more complicated. Nonetheless, each part of the overall system can be considered

in isolation and modifications can generally be made without impacting on other sections. Complexity, however, refers to interdependency and implies the relationship between elements is as important as the elements themselves. Increasing the number and/or strength of relationships makes a system increasingly complex. Attempting to consider isolated parts of a holistic system (reductionism) fails to understand the overall problem and leads to multi-order and unanticipated consequences. Invariably the outcome is worse than the starting state.¹¹

Complex problems come in many guises. Di Russo's *Stratification of Design Thinking* pyramid highlights the need for different approaches based on degree of complexity.¹² Expanding the two categories of either designing products (handbags, phones, buildings, etc) or changing a system (strategic planning, cultural change, or operational design), Di Russo developed her four-tier pyramid similar to Jones and van Platter's 2009 construct (Figure 2).¹³ At the lowest level are mere artefacts (fashionwear) while the next level up expands artefacts with experience ('The Apple Experience' or Tesla cars). The third level includes examples such as urban planning and culture. The apex, and thus most complex environment, includes large scale systems such as environmental and public service.

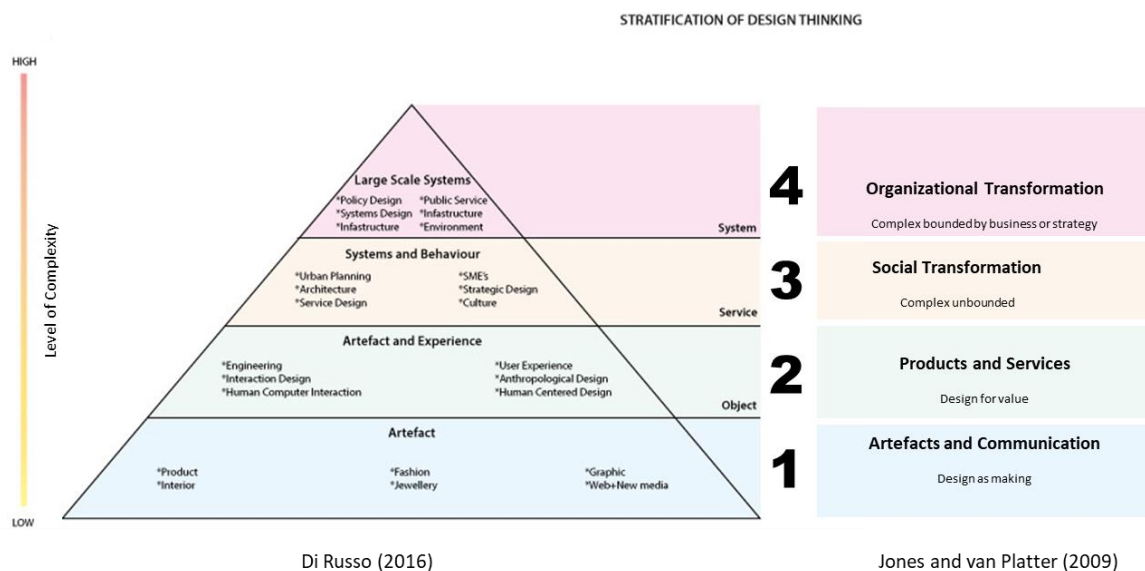


Figure 2 Strata of Complexity—adapted from Allison Bouganim (2020)

Increasing complexity leads to more abstract approaches. At the lower ends of Di Russo's complexity pyramid, scope exists for bounded systems with various rules and predictable behaviors; for example, town planning regulations, building codes, and laws of physics. These shackles are progressively broken, the higher up the pyramid an environment sits, until a utopian world of total freedom exists. Such relaxation is essential to meet the demands of the problems being addressed. It is, therefore, possible to reimagine these strata concepts as a continuum moving from prescriptive to descriptive.

The complexity continuum embraces several loosely overlapping constructs (Figure 3). At the bottom, with low levels of complexity, practitioners can lean heavily on frameworks and doctrine¹⁴. While Alex Ryan might associate this end with the Pragmatist's Camp (Luddites who cling to the security of predictable procedures to yield anticipated outcomes) others would argue all designers are pragmatists. A better label for ontological-centric practitioners might be reductionists. Regardless, the lowest level is heavily guided by structured models and templates. With increasingly complex problems comes the need for more epistemologically influenced approaches (diverse mindsets).¹⁵ Those operating at this extreme might be considered the Reflexive, Humanist, or Purists.¹⁶ An alternative label might be *Design Ethos*, which captures concepts such as: collaborative dialogue, competition of ideas, sense of humility, (among others) as an antidote to counterfeit leadership.¹⁷ While it is difficult to pin a single label for the two extremes, the important point is both offer value. Not only are ontologies and epistemologies mutually dependent, but their dynamic relative contribution is also necessary for differing levels of complexity.

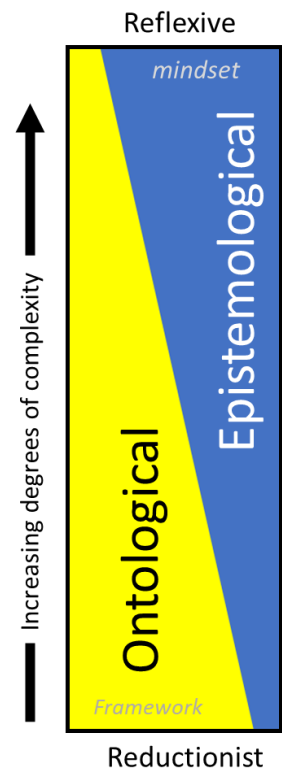


Figure 3 The Ontological-Epistemological continuum

Beyond complexity, lurks another layer of danger. By definition, complexity involves a system and there are several types of these.¹⁸ Added to this is the fact that dynamic systems adapt and evolve with inputs. Depending on the system's inherent level of stability, designers must constantly chase (or attempt to anticipate) the evolving state based on incomplete, partial, and conflicting information. Known as complex adaptive systems (CAS), these challenging problems are still better than the infamous *wicked problems* where the conditions change as soon as the designers apply a solution (input).¹⁹ Thus introducing the notion of the designers being part of the system, and therefore part of the problem.²⁰

The notion of human frailty is increasingly understood in the military. Regardless of whether the task is designing or planning, most military professionals will be taught about cognitive (or unconscious) biases and heuristics at some stage in their formal leadership development. Stemming from Daniel

Kahneman's *Thinking: Fast and Slow* theory,²¹ the risks of intuitive decision-making and staff appraisal writing is explored to some degree. But the leap of faith required to extend this construct is often too much when it comes into embracing chaos as a courageous mindset for resolving complex adaptive systems.²² To exploit divergent positive-deviancy, thinkers must first go anticlockwise on the Cynefin Framework (Figure 4).²³ This bold foray into the dark is an anathema to those who crave order and stability.

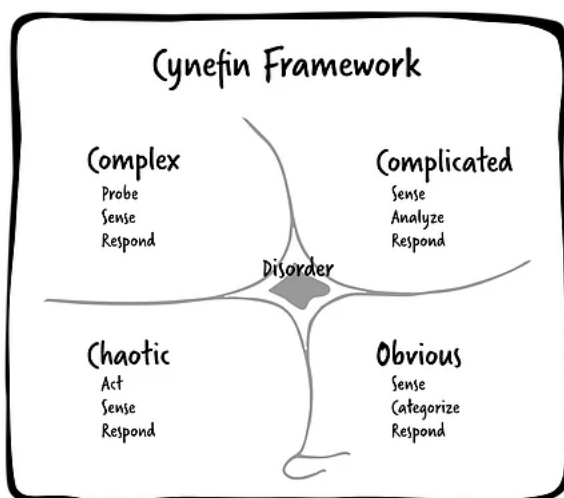
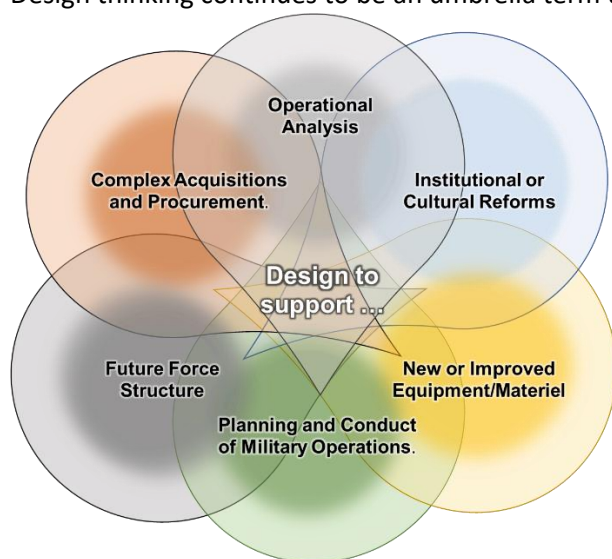


Figure 4 David Snowden's Cynefin Framework in its simplest form. Source: Rivera (2019)

Design Thinking in the Military

Militaries have been using general design thinking across a spectrum of applications for decades. Perhaps the oldest known formal approach is credited to *Staatliches Bauhaus* which emerged in Germany in the aftermath of WW1.²⁴ Now, some 100 years later, other constructs, approaches, and ideas have been adopted from across the general design theory stratosphere. These include design-driven innovation hubs to exploit workplace improvements and technological modifications through to workshops, executive retreats, strategic planning, and even professional military education courses.²⁵ In fact, general design thinking is now widespread across most Western militaries. In the US for example, the Asymmetric Warfare Group exploited both *institutional military innovation* and *operational field-driven adaptation* to defeat drone strikes.²⁶ Another example was the use of design thinking to develop a new leadership curriculum at the National Defense University.²⁷

Design thinking continues to be an umbrella term used to capture a wide range of cognitive activities



throughout military activities. Leveraging off emerging tools and concepts in the public sector, various military organizations have adopted one or more approaches to aid them in accelerating their journey to success. A workshop held at the Australian Defence College in early 2021 revealed diverse units across the ADF were exploiting design thinking in a wide range of settings. A thematic analysis of this systemic employment revealed six interrelated employment areas (Figure 5). Of these, the specific label of Military Design Thinking, or MDT, only refers to the narrower sense of planning and conducting military operations.²⁸

Figure 5 Five thematic areas where Design Thinking is employed in the Australian Defence Force

Military Design Thinking

MDT is easier to define than the plethora of the general design thinking constructs. It remains a microcosm of the broader system of systems, but is specifically targeted at planning military operations. Phillipe Beaulieu-Bossard and Phillip Dufort define MDT as an umbrella term for loosely aligned approaches which facilitate understanding of 'a current conflict environment from a holistic perspective'. They go on to explain how it helps 'imagine a desired post-conflict environment and to realize it with counter-intuitive military and non-military means.'²⁹ This Canadian interpretation gives rise to their prudent 'epistemological agnosticism approach for design theory'³⁰ which developed out of Ben Zweibelson's "agnostic mixed methods design" theory. In other words, even within relatively recent MDT literature, there are already multi-, inter-, and trans-paradigmatic approaches. Yet the label might be adding to the confusion.

Military Design Thinking is neither unique to the military, nor does it account for the other five categories of general design thinking used in the military (Figure 5). Despite believing the profession of arms is unique in operational planning, their largely linear planning systems (critical factor analysis) are mirrored by other large-scale government and Non-Government Organization (NGO) agencies

such as health, police, and disaster response teams.³¹ Nonetheless, the label *military* design thinking has been coined to distinguish operational and strategic planning approaches from the world of handbag designers. Alternate options include Zweibelson's 'security design' or Phillippe Beaulieu-Bossard's longer 'Design driven conceptual innovation for defence & security purposes'.³² He also advocates *Design Theory*, over *Design Thinking*. To help distinguish the security sector from fashion designers. At the time of writing, the growing body of literature on MDT (or variants) was well over 205 peer-reviewed publications.³³

MDT might be a new label, but the underpinning concept is not. Beyond *Leonardo da Vinci* and *Staatliches Bauhaus*, more recent exploration of alternate thinking systems is attributed to Robert McNamara's introduction of systematic thinking³⁴ in the 1960s and the Soviet construct of operational art. In terms of an early ontological framework, credit is given to Shimon Naveh's 1994 PhD from Kings College, London.³⁵ The subsequent Systemic Operational Design (SOD) continues to evolve and today exists in many guises across the globe.

Current variants of MDT overlap and interbreed. Naveh's latest iteration is Systemic Inquiry in Operational Mediation (SIOM),³⁶ while the US Joint Special Operations University have developed an extensive suite of design programs,³⁷ with the more mainstream US Army doctrine embracing the Army Design Methodology (ADM). The UK seem to have made a conscious decision to avoid the term, but have included the concept in their planning doctrine.³⁸ Canada, while still teaching *epistemological agnosticism*, are currently exploring an organic approach to military design based on patterns of tacit conceptual innovation practice across Canadian Forces organisations.

Australia has largely danced around the concept of MDT, despite the passionate efforts of a few. Their current Joint Military Appreciation Process (JMAP)³⁹ paves the way for greater employment of MDT, yet most⁴⁰ practitioners gloss over the nuanced opportunities for divergent thinking and continue to collapse back to their default, product-driven, linear planning mindset. In fact, the lack of practitioners with a purist mindset is one of the greatest challenges to MDT's widespread acceptance. Most operational planners seem to have little interest in exploring *radical humanism*⁴¹ to any depth.

The Philosopher's Zone

MDT extends beyond ontological and epistemological methods into the higher levels of theoretical influences. This zone is the highest level of MDT and should be the goal of any serious student in the profession of arms. This exploration, through triple loop learning,⁴² is the engine room for not only those who design design, but all practitioners who are serious about exploiting the operational art. By challenging the ideological underpinnings, strengths, and weaknesses of various paradigms designers not only discover the concept's true meaning but they contribute to its continual improvement.

Excellence in the workplace comes from depth of understanding to find more than just a faster horse. As Gareth Morgan highlights, 'there is nothing so practical as a good theory. Practice is NEVER theory free...in any sustained endeavor we are guided by implicit root images that generate theories of what

we are doing. It is vital that we know what they are and the strengths and limitations they express.⁴³ Thus, the tenants of design thinking must be applied to the endless pursuit of the profession of arms—viz. a constant hunger for improvement.

The Need for a Framework

The biggest challenge with adopting Military Design Thinking is the number of decision makers who do not understand it. While the fault lies with the proponents, more needs to be done to overcome this barrier. The problem can be considered through various lenses. The first being superficial awareness leads to a race to solutionising. Senior officers got to where they are because they project an air of confidence and decisiveness. This is

perceived as wit, and quickness of understanding. In the same way operational and strategic artists need to be adept at identifying the critical nodes and relationships in an otherwise overwhelming causal link diagram, they are trained to judge an article by skimming a few pages. The irony of this is that they are the very people who need to slow down sometimes and spend longer understanding the situation. Design thinking is about exploring new and novel solutions to complex situations. They also need to trust expert advisors instead of assuming they, and they alone, must be seen to be the leader.

Many detractors of military design thinking are quick to apply pattern recognition to the simplified steps (ontology) and race to align it with existing schema in their consciousness. In other words, they typically respond with ‘oh, this is just like JMAP’. Interestingly, one junior officer on a recent special forces MDT course remarked ‘this is how JMAP is supposed to work’. The nuanced difference between the two comments is in the mindset (epistemology). Despite the way it is articulated in doctrine, the way operational planning processes are typically taught or employed is more akin to the race for a quick solution. This is often exasperated by a commander who has already determined the preferred Course of Action long before the staff have begun crunching the numbers.

MDT is often discussed in complex way. The irony being those who passionately promote design thinking are also those who are very comfortable with complexity. In fact, they advocate exploiting the complex-chaotic realm of the Cynefin framework (Figure 4) to explore optimum options. Despite efforts to reduce complex concepts and language for introductory level audiences, it is often still overwhelming. The crawl-walk-run approach to addressing this problem is to ease learners into the concept through simply frameworks before adding greater complexity. The ultimate goal being the mindset shifts (epistemology).

The remaining challenge to implementing MDT is encouraging practitioners not to stop at the lowest levels of simplified ontologies. Those who dip their toes into the entry-level systems are often quick to announce they already employ design thinking, while in reality they fail to grasp the superficiality of the stage they are at. Part of the problem is the absence of a taxonomy to rank different MDT systems. This paper, therefore, attempts to highlight, not only the fact there are different approaches to design thinking, but there is a hierarchy to match levels of complexity. By appreciating the escalating

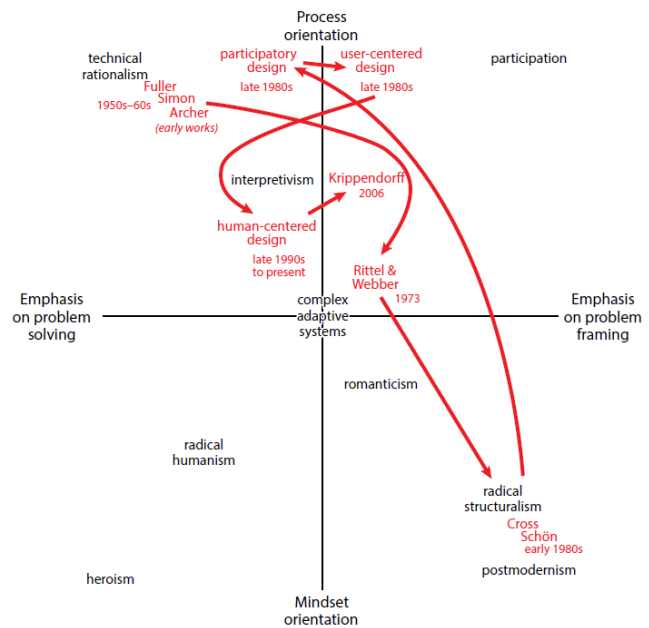


Figure 6 'Relationship between civilian design methodologies and underlying paradigms.' An example of meta-design at the philosophical level (Jackson 2020)

levels, there is scope for recognising not all design thinking approaches are made equal. Exploiting MDT comes from not just having a deeper understanding of particular systems, but progressively exploring more sophisticated approaches. A key indicator is moving away from ontological models into epistemological constructs and eventually the realm of knowledge creation by challenging contemporary philosophical paradigms. The following section offers an imperfect perspective to how complicated, complex, and philosophical are inter-related.

Contextualizing MDT

At the risk of oversimplifying, this paper offers a graphical representation of MDT (Figure 7). Using a funnel metaphor, the open mouth symbolizes the diverse input of philosophical paradigms feeding into the spout's continuum of epistemologies and ontologies. The former is required for higher strata of complexity (mindset orientation) while the latter appealing to the reductionists with its stronger emphasis on ontological frameworks and tools (process orientation) for lower levels of complexity. The Canadian Forces, for example, are not content to label problems simply as complicated or complex, but encourage their students to explore layers of complexity. This deeper understanding helps military designers not only recognize degrees of complexity but helps them develop bespoke approaches.⁴⁴ Sadly, most military off-the-shelf operational planning systems superficially employ design thinking and therefore hover at the absolute bottom of the spout as reductionist ontologies where quick-win products are valued over optimized options. This template-driven approach works well at the more predictable tactical level against smaller scale bounded situations. Thus, the spout's notional extrusion represents strata of complicated problems, which can be addressed through traditional linear problem-solving techniques and computer algorithms.

Complicated problems can be addressed through linear-thinking dogma. Examples of these include TTPs, SOPs, ROE, OFOF Rules, Boldface checklists, tactical-level doctrine, etc⁴⁵ but are borne from the wisdom of more sophisticated triple loop learning.⁴⁶ In other words, some of those lower-level issues can blow up as complex ones under certain circumstances, but well-disciplined personnel who are highly drilled in the relevant procedures, can still be effective without comprehending the potential complexity. This time-honored approach is necessary to help quickly train inexperienced personnel and make them predictable. Simplicity at the edges, complexity at the core.

Any staff officer who can be replaced by a bot... deserves to be.

Columns of text on either side of the funnel indicate various continua of approaches, mindsets, and challenges. The art–science continuum is clearly an oversimplification of the distinction, but hints at a subtle shift in focus from simple through to complicated and then increasingly complex problems. The MDT Framework (Figure 7) is not perfect, but then design thinking is never about perfection.

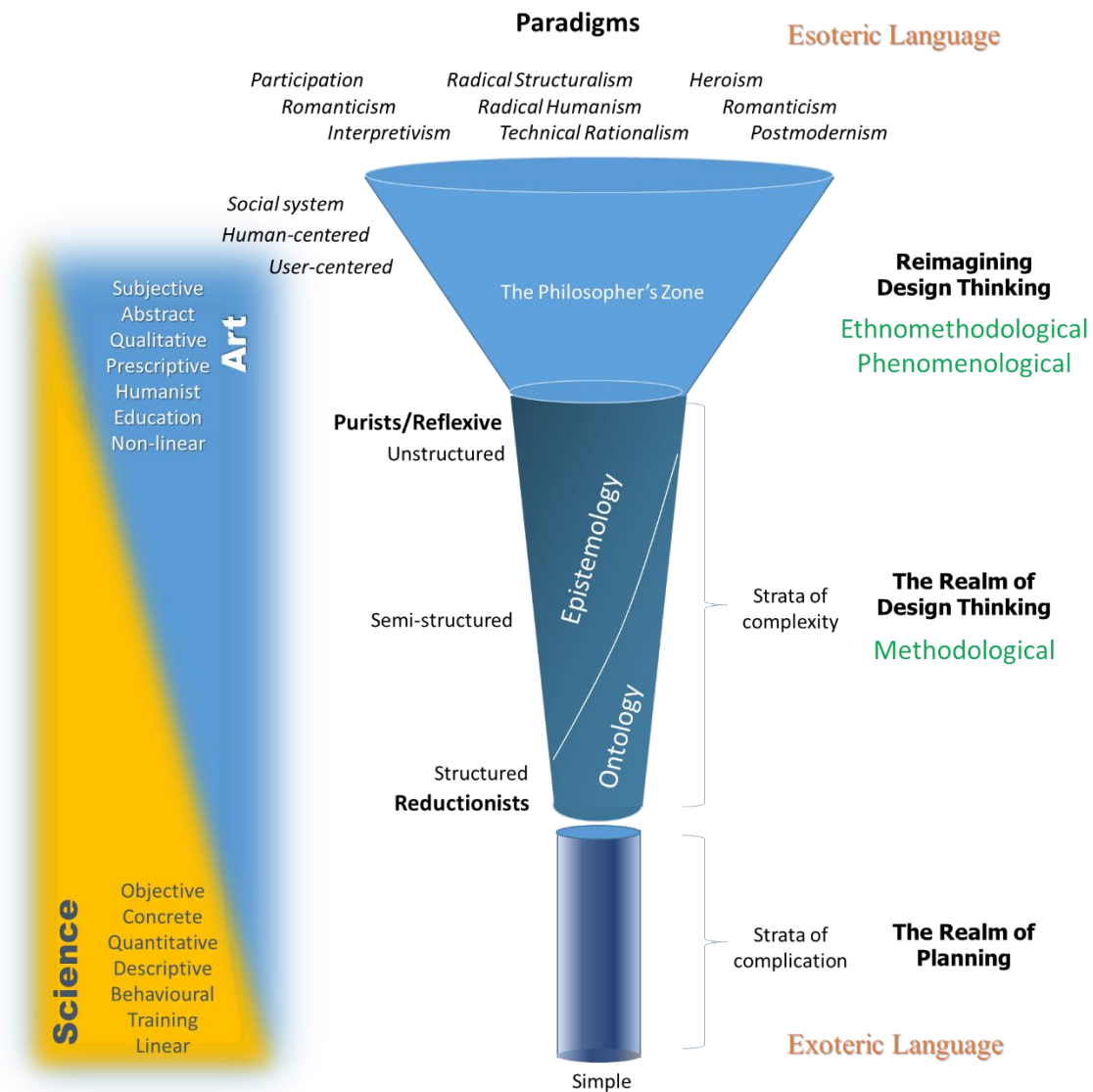


Figure 7 The Military Design Thinking Framework

Summarising MDT's challenges

Military Design Thinking has diverse challenges in being accepted as mainstream. Despite military schools claiming to develop deeper thinking graduates who exploit 'the intellectual edge', many remain constrained by institutional inertia and risk-adverse leaders.⁴⁷ Typically, senior appointments of such colleges are excellent warfighters who excelled in the Clausewitzian paradigm of transactional, linear logic where conservatism is king.⁴⁸ This industrial-era approach is so entrenched, it is difficult to break from the assembly-line mass-education delivery, which Zweibelson describes as 'the pedagogy of essentialism.'⁴⁹ Even in operational headquarters, opportunities are missed.⁵⁰ Ontological processes are often product focused, rather than epistemologically-driven, deep alternative thinking.

Design Thinking challenges extend to organizational culture. Although the youthful new members appear less constrained, junior officers soon become caught up in the bureaucracy of a centralized, autocratic system where positive deviancy is overtly discouraged—despite the politically correct posters and banners quixotically claiming otherwise.

A significant challenge lies in the uptake and integration of the upper echelons of MDT complexity. Figure 3 illustrates the journey from reductionist to reflexive design thinking, whereby uptake in the reductionist side is much easier, however, less complex—and therefore, less effective. Military planning systems currently employed such as JMAP, are successful due to their ease of student comprehension. This heavily reduced system ensures a quick and easy, *follow the bouncing ball* approach to military planning. Its strength lying in the relative simplicity to learn and employ. Yet here lies its limitation. MDT must address its obvious challenge as a complex system which—although the fundamentals can be grasped relatively quickly—its true power is only unleashed when practitioners pursue a more epistemologically, and then philosophically, enlightened understanding. In other words, military planners who cling to *paint-by-numbers* models from the so-called tool-box of methods, are performing design in name only. The true value of this concept is the mindset shift that only comes with sustained and deeper employment of alternative thinking approaches.

MDT works at a level above linear thinking where epistemological, and then philosophical, levels dominate. With linear thinking having dominated military planning for centuries, implementing a system which operates purely at such elevated levels has the potential to be discarded as the gap is too big. It is a bit like teaching beginner French by only speaking French. Hence, the need to level-match the initial introduction on MDT becomes evident.

Closing Reflections

This paper proposes a conceptual framework for contextualizing military design thinking. Situated within a continuously evolving and diversifying field of study, it transcends epistemologies, paradigms, ontologies and methodologies from tactical to grand strategic levels. At its very core, design thinking aims to foresee what is not yet there and add value to a system before it knows it needs it. In a military context, design thinking aims to target the dichotomy between the historical rigidity of military planning processes and the necessity for innovation in a dynamic world.

The fast-paced nature of modern warfare no longer allows for reactive doctrinal approaches to military planning. With the character of war changing to encompass multi-domain, integrated threats, the complexity of warfare changes with it. As such, military design thinking allows for a more holistic approach, transcending the linear planning space from the tactical level through to solving complex adaptive systems and even wicked problems at the strategic level.

The MDT Framework is built by linking various established models to simplify the ironically complex nature of a paradigm designed to solve complex problems. The beauty of design thinking is its ability to apply to all facets of Defence, while maintaining an adaptive and innovative environment. Although being a modern field of study, the concepts of design thinking have been lurking in the shadows of military innovation for centuries.

A dogmatic force, is a dead force.

Glossary

ADC	Australian Defence College
ADF	Australian Defence Force
CMAP	Combat Military Appreciation Process
IMAP	Individual Military Appreciation Process
JMAP	Joint Military Appreciation Process
MDMP	Military Decision Making Process
MDT	Military Design Thinking
OFOF	Orders For Opening Fire
OPP	Operational Planning Process
ROE	Rules of Engagement
SMAP	Staff Military Appreciation Process
SMEAC	Situation, Mission, Execution, Admin & Logistics, Command & Communications
SOPs	Standard Operating Procedures
TTPs	Tactics, Techniques, and Procedures
VUCA	Volatile Uncertain Complex and Ambiguous

Endnotes

- ¹ Harold Nelson's famous quote 'Humans did not discover fire, they designed it', speaks to the ancient origins of human design thinking. (The Design Way: Intentional Change in an Unpredictable World 2014)
- ² Homage is paid to those who explore MDT in more depth. This article's dilution of design thinking's essence is an acknowledged, but necessary, oversimplification to help demystify the vortex of overlapping jargon and concepts for entry-level designers. Rebuttal is encouraged.
- ³ (Lowther, et al. 2020)
- ⁴ Whether Henry Ford himself actually said it is a moot point, the sentiment remains valid. See Vlaskovits (2011).
- ⁵ Quoted in Nelson and Stolterman (2014) *The Design Way*, pp 1-2, although it is a paraphrase of Buchanan, 'Wicked Problems in Design Thinking' (1992).
- ⁶ For example, see (SenGupta 2021)
- ⁷ William B Rouse, Design for Success; A human-centred approach to designing successful products and systems
- ⁸ The term *wicked problems* was first coined by Rittel and Webber (1973) but is widely discussed in the academic literature in various guises.
- ⁹ As discussed by Aaron Jackson on p 3 of *Design Thinking* (2020)
- ¹⁰ This evolution is discussed in various fora. For examples, see Jackson (2020), Di Russo (2012), or Jen (2018)
- ¹¹ For a simple guide to problem types, see (Sridharan 2018).
- ¹² Similar constructs of layers, or domains, of complexity have been offered by Jones and van Platter (2009), and Allison Bouganim (2020). For more, see (Bouganim 2020) and (Di Russo, Understanding the behaviour of design thinking in complex environments 2016).
- ¹³ For more on their original framework, see Jones and van Platter (2009)
- ¹⁴ The label *Doctrine* has evolved over time to the point where some now use it to describe the step-by-step guide for kicking in doors, while others still think of it as more philosophically inspired general guidance. In the reference made here, it is the lowest order of the pyramid and therefore, barely on the ladder for design thinking.
- ¹⁵ By way of definition, this paper defines ontologies as models, frameworks, and/or taxonomies to simplify systems into tangible visualizations to enhance clarity of relationships. Epistemology, in contrast, is a more abstract *way of thinking* about knowledge. For more, see (Chesky and Wolfmeyer 2015)
- ¹⁶ For more on Purists and Pragmatists, see Ryan (2016). For more on the term Reflexive, see Donald Schön's (The Reflective Practitioner: How Professionals Think In Action 1983) development of John Dewey's seminal work (Logic: Theory of inquiry 1938).
- ¹⁷ For more on Design Ethos and its related elements, see Colonel Perez's YouTube Channel (Arguing the OE, Episode 3: Design, Part 2, The Design Ethos 2013).
- ¹⁸ Edgar Morin identified restricted and general complexity with both being interrelated, but the former being reducible while the latter valuing the relationships and dynamic nature the defining criteria (Morin 2007).
- ¹⁹ The concept of *wicked problems* (Rittel and Webber 1973) has evolved to include concepts such as *super wicked problems* (Levin, et al. 2009), and thinking around how to address wicked problems (Roberts 2000).
- ²⁰ This issue highlights the shift from external focus (the problem), to internal focus (conscious self-reflection of the designers), before acknowledging the role of the user, and finally onto a hybrid of all three. For more, see Jackson (2020, 22).
- ²¹ Daniel Kahneman (2011), *Thinking, Fast and Slow*.
- ²² For more on the exploitation of chaos as a design thinking ontology, see David Snowden's *Cynefin Framework* at Cognitive-Edge.com, or Snowden and Boone (2007) as well as other interesting topic explorations in David's blogs (2020)
- ²³ The *Cynefin Framework* is a world leading system that is far more sophisticated than represented in this graphic. On face value, such a grid implies there are clear boundaries between the categories, while a more detailed exploration of the method the nuanced transitions are less obvious.
- ²⁴ For more on Staatliches Bauhaus' legacy, see (Zweibelson, A Military Design Movement: Postmodern Comedians of War 2020).
- ²⁵ For more on Design-driven innovation see (Verganti 2009)
- ²⁶ (Allen, Brown and Askonas 2020)
- ²⁷ (Paparone 2019)

²⁸ It is somewhat ironic that the legacy label *planning* is retained when the term implies linear, procedural approaches to solving complicated problems.

²⁹ Phillipe Beaulieu-Bossard and Phillip Dufort (2017)

³⁰ (Mitchell 2017)

³¹ One such example was the 2020 response to the Covid-19 pandemic—see Aragón (2021). Reference to the World Health Organization can be found at Rivera (2019).

³² From a personal correspondence dated 24 January 2021.

³³ A recent critical literature review found 444 search results relating to MDT or cognates, although the study limited its data sources, so the real number would be much higher (Wrigley, Mosely and Mosely, Defining military design thinking; An extensive critical literature review 2021).

³⁴ Systematic (a logical and thorough process) and systemic (treating something as a whole) thinking are quite different, but the earlier work triggered deeper exploration of metacognition.

³⁵ Naveh's PhD thesis was later published as a book (Naveh 1997)

³⁶ Systemic Operational Design (SOD) 1995-2005, Systemic Design Inquiry (SDI) 2006-2012, and Systemic Inquiry in Operational Mediation (SIOM) 2013-present. For more, see Graicer (2017).

³⁷ For more see Joint Special Operations Centre for Continuing Education (JSOU-CCE) Design Faculty's YouTube Channel *Think JSOU* (https://www.youtube.com/channel/UCL7hOd0ihWzmJlga_Y4wCJg), their website, and Peterson's (2021), article on *Project Galahad*.

³⁸ For more, see (Zweibelson, A Military Design Movement: Postmodern Comedians of War 2020, 396-414)

³⁹ JMAP is similar to US Army's Military Decision-Making Process (MDMP), Canadian Forces, Operational Planning Process (CF OPP), NATO, Operational Planning Process (OPP), US Marine Corps Planning Process (MCP), and US Special Operations Command, Strategic Planning Process (SPP), among others.

⁴⁰ This assessment is purely anecdotal and based on eight years of observing staff course students transitioning to JMAP.

⁴¹ While radical humanism (Neohumanism) can be found across a variety of scholarly publications, a quick exposition can be found in Marić (Enhanced four paradigms of information systems development in networked societies 2012).

⁴² For more on Triple Loop Learning, see Argyris (1993).

⁴³ Morgan, (Images of Organization 2006, 364-365).

⁴⁴ In late 2021, the Canadian Forces College intend offering an elective in 'Design Leadership and Judgement'.

⁴⁵ These all refer to black and white rules that are provided to junior level personnel to be safe and effective in a short amount of time and under stress. TTPs (Tactics Techniques and Procedures), SOPs (Standard Operating Procedures), ROE (Rules of Engagement), OTOF rules (Orders For Opening Fire), while Boldface checklists (refers to the emergency drills for aircrew).

⁴⁶ When things go wrong on operations, the traditional lessons-learned/noted process reviews post activity reports and investigations to recommend changes to ontological procedures (Single Loop learning). When the doctrine is found to be faulty then the epistemological principles are reconsidered (Double Loop Learning). And when the epistemology is found wanting, then the organization must reevaluate its underlying philosophical paradigms (Triple Loop Learning).

⁴⁷ (Grisogono 2020)

⁴⁸ For more on this see Franklin Annis' Why is the Army preparing for 21st Century war with a 19th-Century approach to learning (2020).

⁴⁹ (Zweibelson, Jackson and Bernard, Teachers, leave them kids alone: Debating two approaches for design education in military organisations 2020)

⁵⁰ For an enlightened exposé of the epistemological challenges with the ADF's Joint Operations Centre see Indi Pain's essay (Systemic Struggles: JOC v JMAP 2020)

Bibliography

- Allen, T S, Kyle Brown, and Jonathan Askonas. 2020. "How the Army out-innovated the Islamic State's drones." *War on the Rocks (Texas National Security Review)*. December 21. Accessed January 2, 2021. <https://warontherocks.com/2020/12/how-the-army-out-innovated-the-islamic-states-drones/>.
- Annis, Franklin. 2020. "Why is the Army preparing for 21st Century war with a 19th-Century approach to learning." *Modern War Institute at West Point*. March 17. Accessed March 11, 2021. <https://mwi.usma.edu/army-preparing-21st-century-war-19th-century-approach-learning/#:~:text=FICINT-,Why%20is%20the%20Army%20Preparing%20for%2021st%2DCentury%20War%20with,19th%2DCentury%20Approach%20to%20Learning%3F&text=The%20US%20Army%20has%20had,the%20>0.
- Aragón, Tomás J., Sara H Cody, Lisa B Hernandez, Christopher Farnitano, Scott A Morrow, Erica S Pan, Ori Tzvieli, and Matthew Willis. 2021. "Crisis Decision-Making at the Speed of COVID-19: Field Report on Issuing the First Regional Shelter-in-Place Orders in the United States." *COVID-19 and Public Health: Looking Back, Moving Forward (Journal of Public Health Management and Practice)* 27 (Supplement 1): 19-28.
- Argyris, C. 1993. *On organizational learning*. Cambridge: Blackwell Business.
- Beaulieu-Bossard, Phillipe, and Phillipe Dufort. 2017. "Introduction: Revolution in Military Epistemology." *Journal of Military and Strategic Studies* 17 (4): 2.
- Bouganim, Allison. 2020. "A case for systemic design." *uxplanet.org*. Dec 31. Accessed January 2, 2021. <https://usplanet.org/a-case-for-systemic-design-5a9465b870fa>.
- Buchanan, Richard. 1992. "Wicked problems in design thinking." *Design Issues (MIT Press)* 8 (2): 5-21.
- Celestino T. Perez, Jr. 2013. "Arguing the OE, Episode 3: Design, Part 2, The Design Ethos." *YouTube*. april 10. Accessed april 12, 2021. https://www.youtube.com/watch?v=3eyTsRaMXzY&ab_channel=ArguingTheOE.
- Chesky, Nately Z, and Mark R Wolfmeyer. 2015. "STEM's What, Why, and How? Ontology, Axiology, and Epistemology." In *Philosophy of STEM Education: A Critical Investigation. The Cultural and Social Foundations of Education*, 17-43. New York: Palgrave Pivot.
- Clausewitz, Carl von. 2020. *On War*. 2020. La Vergne : Antiquarius.
- Danish Design Centre. 2015. "The Design Ladder: Four steps of design use." *Danish Design Center*. May 6. Accessed January 11, 2021. <https://danskdesigncenter.dk/en/design-ladder-four-steps-design-use>.
- Dewey, John. 1938. *Logic: Theory of inquiry*. New York: Henry Holt and Company.

- Di Russo, Stefanie. 2012. "A Brief History of Design Thinking: How Design Thinking Came to 'Be'." June 8. Accessed January 11, 2021. <https://ithinkidesign.wordpress.com/2012/06/08/a-brief-history-of-design-thinking-how-design-thinking-came-to-be/>.
- Di Russo, Stefanie. 2016. *Understanding the behaviour of design thinking in complex environments*. PhD Thesis, Swinburne: Swinburne University.
- Ellis, David C., and Charles N. Black. 2018. *Complexity, Organizational Blinders, and the SOCOM Design Way*. Joint Special Operations University, MacDill Air Force Base, Florida: JSOU University Press. https://jsou.libguides.com/ld.php?content_id=51791951.
- Field, Chris. 2020. "Five Ideas: On Planning." *The Cove*. August 11. Accessed January 12, 2021. <https://cove.army.gov.au/article/five-ideas-planning>.
- Graicer, Ofra. 2017. "Self Disruption: Seizing the High Ground of Systemic Operational Design (SOD)." *Journal of Military and Strategic Studies* 17 (4 Special Issue: Reflexive Military Practitioners: Design Thinking and Beyond): 21-37. http://militaryepistemology.com/wp-content/uploads/2017/09/Graicer_Self-Disruption_2017.pdf.
- Grisogono, Anne-Marie. 2020. "On the roles of design in Defence." In *Design thinking: Applications for the Australian Defence Force*, by Aaron Jackson, 71-88. Canberra: ADC Publications.
- Jackson, Aaron. 2020. *Design thinking in commerce and war: Contrasting civilian and military innovation methodologies*. Vol. 7. Maxwell Air Force Base, Alabama: Air University Press.
- . 2020. *Design thinking: Applications for the Australian Defence Force*. Canberra: ADC Publications.
- Jackson, Aaron. 2020. "Introduction: What is design thinking and how is it of use to the Australian Defence Force?" In *Design Thinking: Applications for the Australian Defence Force*, by Aaron Jackson, 1-26. Canberra: Australian Defence College.
- Jen, Natasha. 2018. "History of Design Thinking." *The Design Thinker*. March. Accessed January 11, 2021. <https://www.thedesignthinker.com.au/history/>.
- Jones, P H, and G K van Platter. 2009. *Design 1.0, 2.0, 3.0, 4.0: The rise of visual sensemaking*. New York: NextDesign Leadership Institute.
- Kahneman, Daniel. 2011. *Thinking, Fast and Slow*. Farrar, Straus and Giroux.
- Levin, K., B. Cashore, S. Bernstein, and G. Auld. 2009. "Playing it forward: Path dependency, progressive incrementalism, and the "Super Wicked" problem of global climate change." *International Studies Association Annual Convention (February 28th – March 3, 2007)*. Chicago, IL, . Accessed January 12 2021. https://www.researchgate.net/publication/251880216_Playing_it_forward_Path_dependency_progressive_incrementalism_and_the_Super_Wicked_problem_of_global_climate_change.
- Lowther, Adam, Brooke Mitchell, Gerard Puccio, and Nathan Schwagler. 2020. "Embedding creativity in professional military education: Understanding creativity and its implementation." *The Strategy Bridge*. August 10. Accessed January 13, 2021. <https://thestrategybridge.org/the->

bridge/2020/8/10/embedding-creativity-in-professional-military-education-understanding-creativity-and-its-implementation.

- Marić, Borislav. 2012. "Enhanced four paradigms of information systems development in networked societies." School of Computing, Blekinge Institute of Technology, Karlskrona, Sweden. Accessed January 15, 2021. <http://www.diva-portal.org/smash/get/diva2:831618/FULLTEXT01.pdf>.
- Mitchell, Paul T. 2017. "Stumbling into design : Action experiments in professional military education at Canadian Forces College." *Journal of Military and Strategic Studies. Special Issue. Reflexive military practitioners: Design thinking and beyond* 17 (4): 84-102.
- Morgan, Gareth. 2006. *Images of Organization*. York University, Canada: Sage Publications.
- Morin, Edgar. 2007. "Restricted complexity, General complexity." In *World views, science and us: Philosophy and complexity*, by Carlos Gershenson, Diederik Aerts and Bruce Edmonds, 5-29. London: World Scientific Publishing Co.
- Naveh, Shimon. 1997. *In Pursuit of Military Excellence: The Evolution of Operational Theory*. Taylor & Francis.
- Nelson, Harold G., and Erik Stolterman. 2012. *The Design Way : Intentional Change in an Unpredictable World*. Cambridge, MA: MIT Press.
- . 2014. *The Design Way: Intentional Change in an Unpredictable World*. 2nd. Cambridge, MA: MIT Press.
- Pain, Indi. 2020. *Systemic Struggles: JOC v JMAP*. Commander Joint Operations Centre' essay competition, Canberra: unpublished essay.
- Paparone, Christopher. 2019. "Attempting Radical Change to a Leadership Curriculum." *ThinkJSOU*. Accessed March 11, 2021. https://www.youtube.com/watch?v=qraEdWcMNMYY&ab_channel=ThinkJSOU.
- Patterson, Thomas. 2019. "The "grey zone": Political warfare is back." *The interpreter*. The Lowy Institute. September 3. Accessed January 11, 2021. <https://www.loyyinstitute.org/the-interpreter/grey-zone-political-warfare-back#:~:text=Political%20warfare%20involves%20so%2Dcalled,%2Dkinetic%20and%20non%2Dl ethal>.
- Peterson, Nolan. 2021. "Inside Project Galahad: How the 75th Ranger Regiment used 'creative destruction' to prepare for the modern battlefield." *Black Rifle Coffee Company*. January 6. Accessed January 11, 2021. https://coffeeordie.com/project-galahad//?fbclid=IwAR0IWvUt4nACHwt4JS0jXbJ91Ah3hSdqJJaELhI73q4_-qIRPJCC16Ds3Gc.
- Rittel, Horst W. J., and Melvin M Webber. 1973. "Dilmenas in general planning." *Policy Sciences* 4 (2): 155–169.
- Rivera, Brian. 2019. "The New Killer App: The OODA loop and Cynefin framework. Part I." *AGLX*. November 15. Accessed January 10, 2021. <https://www.aglx.consulting/post/the-new-killer-app-the-ooda-loop-and-cynefin-framework-part-i>.

- Roberts, N.C. 2000. "Wicked Problems and Network Approaches to Resolution." *International Public Management Review*. (International Public Management Network) 1 (1).
- Ryan, Alex. 2016. "A personal reflection on introducing design to the US Army." *Medium (Blog)*. November 4. <https://medium.com/>.
- Schön, Donald. 1983. *The Reflective Practitioner: How Professionals Think In Action*. London: Temple Smith.
- SenGupta, Reena. 2021. "How 'design-thinking' can help lawyers do a better job." *Financial Times*. February 11. Accessed February 17, 2021. <https://www.ft.com/content/25480beb-0e15-41e9-b2f4-1fa84302308c>.
- Snowden, David. 2020. "Flexuosity untangled." *Cognitive Edge*. November 14. Accessed January 11, 2021. <https://www.cognitive-edge.com/flexuosity-untangled/>.
- Snowden, David J., and Mary E. Boone. 2007. "A Leader's Framework." *harvard business review* Reprint: 1-8. <https://pablopernot.fr/pdf/Cynefin-Mary-Boone.pdf>.
- Sridharan, Mithun. 2018. "Cynefin Framework: Between chaos and order." *Think Insights*. November 19. Accessed January 10, 2021. <https://thinkinsights.net/strategy/cynefin-framework/>.
- van der Veer, Jeffrey. 2015. "The rise of design: Why an innovative concept is emulated in armies." MA Thesis, Royal Netherlands Defence College. <http://militaryepistemology.com/wp-content/uploads/2018/04/The-Rise-of-Design.pdf>.
- Verganti, Roberto. 2009. *Design-driven innovation: Changing the rules of competition by radically innovating what things mean*. Boston, MA.: Harvard Business Press.
- Vlaskovits, Patrick. 2011. "Henry Ford, Innovation, and That "Faster Horse" Quote." *Harvard Business Review*. August 29. Accessed January 9, 2021. <https://hbr.org/2011/08/henry-ford-never-said-the-fast#:~:text=%E2%80%9CIf%20I%20had%20asked%20people,and%20air%20of%20self%20Devide,nce>.
- Wrigley, Cara, and Karla. Straker. 2015. "Design Thinking pedagogy: the Educational Design Ladder." *Innovations in Education and Teaching International* 1-12.
- Wrigley, Cara, Genevieve Mosely, and Michael Mosely. 2021. "Defining military design thinking; An extensive critical literature review." *She Ji: The Journal of Design, Economics, and Innovation* 7 (1): 104-43.
- Zweibelson, Ben. 2020. "A Military Design Movement: Postmodern Comedians of War." *Lancaster University, UK*. September. Accessed January 29, 2021. <https://eprints.lancs.ac.uk/id/eprint/150490/1/2020ZweibelsonPhDpdf.pdf>.
- Zweibelson, Ben, Aaron Jackson, and Simon Bernard. 2018. "Teachers, leave them kids alone: Debating two approaches for design education in military organisations." *The Blue Knight Review (Journal of the Royal Military College of St Jean)* (2).

Zweibelson, Ben, Aaron P. Jackson, and Simon Bernard. 2020. "Teachers, leave them kids alone: Debating two approaches for design education in military organisations." In *Design Thinking: Applications for the Australian Defence Force*, by Aaron Jackson, 137-152. Canberra: ADC Publications.