

Designing through Complexity and Human Conflict: Acknowledging the 21st Century Military Design Movement¹

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“To drop one’s tools may be to admit failure. To retain one’s tools is to postpone this admission and feel that one is still in it and still winning...Finally, implicit in the idea that people can drop their tools is the assumption that tools and people are distinct, separable, and dissimilar...it is not surprising that dropping one’s tools creates an existential crisis.”

- Karl Weick²

“How do we restructure order and meaning from this chaos? A new domain or concept can be formed from common qualities, attributes, or operations...Through connecting the threads we synthesize constituents from these shattered domains. Such a synthesis generates something new, different from what previously existed.”

- John Boyd³

What are the most significant challenges for 21st century military organizations currently? Some might think of Iran, Russia, or other rival nation state, while others might consider trans-regional criminal networks, decentralized terror cells, or cybercriminals as the significant crisis at hand. Rather than focus on specific or contextual concerns within a single conflict or foreign policy approach, we ought to consider more broadly and abstractly the institutional and international profession challenges in this new millennium. If there may be one common ground against all of those aforementioned threats, it might be that a military organization unable or unwilling to change will potentially end up failing against all of them, or perhaps fixating on one without acknowledging others. Militaries in general face significant organizational and transformative issues where the legacy system or ‘modern military form’ is increasingly insufficient in the emergent 21st century ‘post-Industrial’ world’- where a ‘postmodern military form’ may well be disrupting the latter.⁴

¹ This paper as well as the presented lecture represent the personal opinion of the author and is not to be considered any position or endorsement of the U.S. Department of Defense, U.S. Special Operations Command, or the Joint Special Operations University. The author presented this lecture and white paper at the request of IBM and NATO.

² Karl Weick, “Drop Your Tools: An Allegory for Organizational Studies,” *Administrative Science Quarterly* 41 (1996): 307–308.

³ John Boyd, “Destruction and Creation” (Unpublished manuscript, 1976), 2–3,
http://www.goalsys.com/books/documents/DESTRUCTION_AND-CREATION.pdf.

⁴ Anders Sookermany, “On Developing (Post)modern Soldiers: An Inquiry into the Ontological and Epistemological Foundation of Skill-Acquisition in an Age of Military Transformation” (University of Oslo, 2013); Markus Mader, *In Pursuit of Conceptual Excellence: The Evolution of British Military-Strategic Doctrine in the Post-Cold War Era. 1989-2002* (Bern, Germany: Peter Lang AG, 2004); Paparone, *The Sociology of Military Science: Prospects for Postinstitutional*

First, militaries tend to ‘bet it all’ on a single overarching paradigm for their decision-making and organizational form that is increasingly failing to accomplish desired outcomes. When those outcomes are accomplished, militaries reflectively seek to submit those outcomes as ‘proof’ that the legacy system of modernist form/function remains valid. This single-paradigm process maintains a critical hostility towards the awareness or consideration of other paradigms. To paraphrase sociologist Karl Weick, we become unable to drop our tools, nor even realize we are grasping them as we continue to act.⁵⁶ When this happens to organizations, they tend to struggle to use favorite tools despite their inability to accomplish what they originally intended. Tools, whether tangible or conceptual become tangled up with institutional values, culture, belief systems as well as an organizational resistance to change.

Second, militaries frequently adhere unwittingly to the centralized hierarchical organizational form, in terms of the flow of information, construction of new knowledge, maintenance of organizational knowledge, decision-making, innovation, critical thinking, and risk. Third, the preferred military form emphasizes content (the how and the what) while ignoring critical introspection and creative alternatives of the form itself (why).⁷ Thus, military doctrine, education and training reflect the belief system of that military organization, to include their cultural and societal aspects that establish and maintain an institution therein.⁸

Militaries seek description (what) over explanation (why); simplification over holism; linear predictability and increased control over nonlinear uncertainty and emergent transformation. When militaries fail, they seek to identify what they did (or did not do), how did they do (or not do) it, and attempt to repeat the process while reconfiguring variables. This is done analytically in order to continue to validate the logic of the content without disrupting the form (why one does what one does). Challenging the military form is disruptive, transformative, and deconstructive.⁹ Usually, it is dangerous as well.

Military Design; Philippe Beaulieu-Brossard and Philippe Dufort, “Conclusion: Researching the Reflexive Turn in Military Affairs and Strategic Studies,” *Journal of Military and Strategic Studies* 17, no. 4 (June 2017): 273–89.

⁵ Weick, “Drop Your Tools: An Allegory for Organizational Studies.”

⁶ Russell Ackoff, “OR: after the post mortem,” *Systems Dynamics Review* 14, no. 4 (2001): 341-346.

⁷ Shimon Naveh, Jim Schneider, and Timothy Challans, *The Structure of Operational Revolution: A Prolegomena*, A Product of the Center for the Application of Design (internally produced publication: Booz Allen Hamilton, 2009); Paparone and Reed, “The Reflective Military Practitioner: How Military Professionals Think in Action”; Philippe Beaulieu-Brossard and Philippe Dufort, “Introduction to the Conference: The Rise of Reflective Military Practitioners” (Hybrid Warfare: New Ontologies and Epistemologies in Armed Forces, Canadian Forces College, Toronto, Canada: University of Ottawa and the Canadian Forces College, 2016); Willemien Visser, “Schön: Design as a Reflective Practice,” *Collection, Art+Design & Psychology*, no. 2 (2010): 21–25.

⁸ Aaron Jackson, *The Roots of Military Doctrine: Change and Continuity in Understanding the Practice of Warfare* (Fort Leavenworth, Kansas: Combat Studies Institute Press, 2013); Aaron Jackson, “Doctrine, Strategy and Military Culture: Military-Strategic Doctrine Development in Australia, Canada, and New Zealand, 1987-2007” (Ministry of National Defence, Australia, 2013); Mader, *In Pursuit of Conceptual Excellence: The Evolution of British Military-Strategic Doctrine in the Post-Cold War Era. 1989-2002*.

⁹ Ofra Gracier, “Self Disruption- Beyond the Stable State of SOD,” in *Cluster 1* (Hybrid Warfare: New Ontologies and Epistemologies in Armed Forces, Canadian Forces College, Toronto,

Fourth, militaries *do reject creativity and innovation* due to the aforementioned institutional challenges; at least, they reject anything that they do not already pre-approve within often narrow analytic and institutionally compliant parameters. Further, anything that threatens to disrupt established or ritualized beliefs of the organization will be ignored, misunderstood or feared. This does not leave very much room for innovation or creativity; at least, not the experimentation that transforms an organization in directions that permit game-changing advantages. This mindset does prioritize convergence, uniformity, loyalty to a fault, as well as a resistance to change. Granted, in periods where tomorrow does end up being quite like yesterday, those military processes that enhance uniformity, convergence, and reliability are exceptional organizational qualities. But what happens when tomorrow defies everything that worked just fine yesterday?

When innovators and creative thinkers operate openly in military organizations or attempt to impact them, the centralized hierarchical form routinely silences or marginalizes them, particularly if they threaten to disrupt cherished rituals or foundational aspects of the organizational identity.¹⁰ Militaries often (but not always) eliminate non-conformists and divergent thinkers directly or through marginalization. They also foster a decidedly STEM-dominant culture for officer candidates and advanced professionals,¹¹ and most professional military schools and training programs as well as doctrinal methodologies create the conditions for increased convergence, uniformity, reliability, and prediction.¹² The dominance of the hierarchically centered control mechanism and a set model for the evaluation of success through pre-established institutional values and norms becomes the measuring stick for what is acceptable as 'creative' as well as acceptable to the institution.

When innovators and divergent thinkers are able to influence a military organization, they are frequently recognized only in retrospect when their contributions become obvious and assimilated into the same single-paradigm linear causality that permits 'ends-ways-means' and reductionist methodologies to continue to operate for decision-making.¹³ The innovator, if the first to demonstrate "that which has never been seen before but is needed by the organization" will trigger an institutional reaction of rejection, skepticism, gradual adaptation and institutional convergence. Militaries over time realize innovation that is novel and perhaps "game-changing", and provided that

Canada: University of Ottawa and the Canadian Forces College, 2016); Boyd, "Destruction and Creation."

¹⁰ Carl Builder, *The Masks of War: American Military Styles in Strategy and Analysis* (Baltimore: Johns Hopkins University Press, 1989); John Nagl, *Learning to Eat Soup with a Knife: Counterinsurgency Lessons from Malaya and Vietnam* (Chicago: University of Chicago Press, 2002); Grant Martin, "Deniers of 'The Truth': Why an Agnostic Approach to Warfare Is Key," *Military Review*, February 2015.

¹¹ W.J. Astore, "America's Military Academies Are Seriously Flawed", *The Contrary Perspective* (December 17, 2014), last accessed on May 22, 2018 at: <https://contraryperspective.com/2014/12/17/americas-military-academies-are-seriously-flawed/>

¹² Christopher Paparone, George Reed, "The Reflective Military Practitioner: How Military Professionals Think in Action", *Journal of Military Learning* (Army University Press, October 2017). Last accessed on June 01, 2018 at: <http://www.armyupress.army.mil/Journals/Journal-of-Military-Learning/Journal-of-Military-Learning-Archives/October-2017-Edition/Paparone-The-Reflective-Military-Practitioner/>.

¹³ Military examples such as the Army Air Corps Billy Mitchell's contributions in the Interwar Period provide exceptional depth to this position, as do the varied academic reflections of military organizations by John Nagl, John Boyd, Shimon Naveh, Carl Builder, and Christopher Paparone.

game-changing event does not destroy the organization during the transformation, it might move to adapt to this new system by incorporating that change. Subsequently, a military may direct the rest of the organization to conform and converge towards this new adaptation instead of outwards towards more innovation and divergent thinking. Critical reflection is only whether the innovation worked, why it worked and whether the institution needs to adapt towards the change in order to remain relevant in this new future system.

Typically, it becomes a career hazard and quite lonely to aim towards innovative and divergent thinking within military organizations without sufficient insulation from the larger military institution. Military leaders that are change agents themselves should foster these spaces where military design and innovation might experiment and play out.¹⁴ These are rare and essential for organizations to continue to move towards institutional relevance and positions of advantage in future emergent systems that strongly differ from the current (or legacy) systems of today.

Why Would Militaries Need Disruptive Thinking through Design?

Modern militaries all use nearly the same reductionist-based mechanistic process of analytic optimization in their decision-making and problem-solving methodologies. Whether called the Joint Planning Process, NATO-Operational Planning Process, the Military Decision-Making Process or any other variation, they all share very similar language, concepts, and an objectivist (largely positivist) logic for contemplating action in reality. In the legacy system or present state, militaries traditionally reverse-engineer their model moving from an imagined single future system or 'end-state' back to the present where the 'problem' is defined as that which is a barrier from reaching this single future.¹⁵

After determining what future state they desire, militaries project the future in some measurable span of time away from the present state in order to frame precisely how they seek to control as well as predict the flow of the system from now into the future. Next, the desired future state is analyzed with military set processes that orient on optimization and system solutions that are expressed in the language of natural sciences. Military doctrine employs 'centers of gravity', lines of effort, objectives tied to effects, with decision points associated with acting upon decisive points oriented towards enemy COG critical vulnerabilities and/or the defense of one's own COG vulnerabilities.¹⁶ As 'lines of effort' are established in time and space, they are organized

¹⁴ Karl Weick, "Reflections: Change Agents As Change Poets- On Reconnecting Flux and Hunches," *Journal of Change Management* 11, no. 1 (March 2011): 7–20; see also: Ben Zweibelson, "Change Agents for the SOF Enterprise: Design Considerations for SOF Leadership Confronting Complex Environments," *Special Operations Journal* 3, no. 2 (Fall 2017): 127–40.

¹⁵ Ben Zweibelson, "One Piece at a Time: Why Linear Planning and Institutionalisms Promote Military Campaign Failures," *Defence Studies Journal* 15, no. 15 (December 14, 2015), <http://www.tandfonline.com/doi/full/10.1080/14702436.2015.1113667>; Christopher Papparone and George Reed, "The Reflective Military Practitioner: How Military Professionals Think in Action," *Military Review*, April 2008, 66–76; Christopher Papparone, *The Sociology of Military Science: Prospects for Postinstitutional Military Design* (New York: Bloomsbury Academic Publishing, 2013).

¹⁶ Christopher Papparone and William Davis Jr., "Exploring Outside the Tropics of Clausewitz: Our Slavish Anchoring to an Archaic Metaphor," in *Addressing the Fog of the COG: Perspectives on the Center of Gravity in US Military Doctrine*, ed. Celestino Perez (Fort Leavenworth, Kansas: Combat Studies Institute Press, 2012); Kurt Vandersteen, "Center of Gravity: A Quest for

in sequential phases or operations that cumulatively build upon previous actions in order to synchronize organizational activities to gain further control of the system, increase prediction, and reduce enemy options until the future desired end-state is reached.

However, complex adaptive systems do not behave in ways that support this logic, nor do they tend to play out in useful ways due to nonlinearity, emergence, and system complexity.¹⁷ This frustrates military organizations. Designer Horst Rittel observed: "*Means and ends...they compose a mutual relationship only definable with respect to a certain problem formulation. The longer the range of task, the more abstractly the problem must be formulated; the longer the chain of means, the more general and abstract the ends.*"¹⁸

Rittel explains that the longer the chain of means, the more general and abstract the 'ends' becomes. This is paradoxical to what military analytic optimization is based upon (such as MDMP, JPP, and even most strategic constructs). Militaries demand a clear and definable goal that is both desired and predicted. We expect a stable reality where laws, rules and principles (once established) continue to work at any time or place. Just as gravity is constant as a law anywhere on the planet, we expect principles of war (or centers of gravity, lines of effort, measures of performance) once defined and validated as "war rules" to also work in any military conflict at any time in any place...with some flexibility of "you need to apply those principles correctly to win".

Rittel provided additional challenges to how the military traditionally seeks to consider war and complexity, in that complex problems *do not have stopping rules*.¹⁹ They continue on, emerging and changing. We just get on and off them due to time, money and patience (which are entirely contextual and irrelevant to the complexity of the problem!). Nothing can be optimized in a complex dynamic system. There are unlimited possible solutions, and there is no testing that can be done to determine which are better than others. Everything is a tailored "one shot chance" that transforms the system upon action. *This removes analysis as well as linear cause-effect, no matter how much we demand that it occur.* Complex adaptive systems are entirely unique. *One cannot learn for the next time...one cannot run simulations or develop ground rules.* Any success is isolated to that one instance, and attempting the same action again results in an entirely different outcome every time. These perspectives on complexity essentially dismantle or disrupt nearly all traditional military decision-making and problem-solving methodologies.

Over the past near two decades of perpetual war and military soul-searching due to so many practices failing to work as expected or previously, the term 'design' has become somewhat of a confusing buzz word as well as the legitimate and vital exploration of human creativity and imagination. Even the term 'design' is confusing within the tangled web of military, governmental, and business practices that interplay

Certainty or Tilting at Windmills," in *Addressing the Fog of the COG: Perspectives on the Center of Gravity in US Military Doctrine*, ed. Celestino Perez (Fort Leavenworth, Kansas: Combat Studies Institute Press, 2012), 33–64.

¹⁷ Antoine Bousquet and Simon Curtis, "Beyond Models and Metaphors: Complexity Theory, Systems Thinking and International Relations," *Cambridge Review of International Affairs* 24, no. 1 (2011): 43–62; Paul Cilliers, "Complexity, Deconstruction and Relativism," *Theory, Culture & Society* 22, no. 5 (2005): 76–94; Jeff Conklin, "Wicked Problems and Social Complexity," in *Dialogue Mapping: Building Shared Understanding of Wicked Problems* (CogNexus Institute, 2008), <http://www.cognexus.org>.

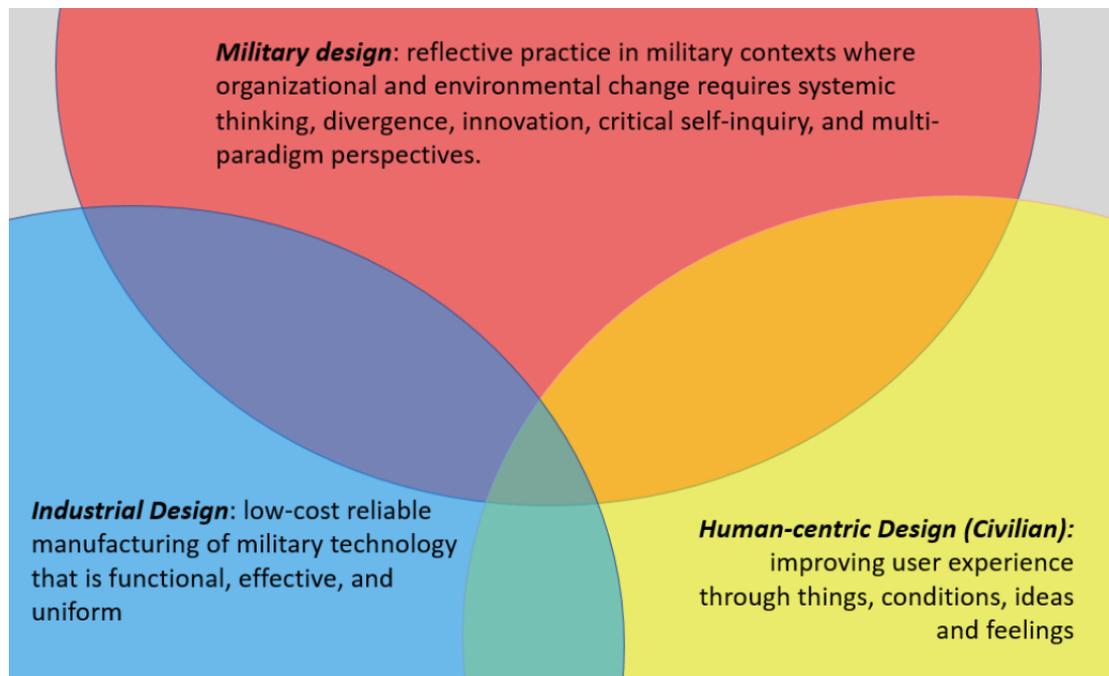
¹⁸ Jean-Pierre Protzen and David Harris, *The Universe of Design: Horst Rittel's Theories of Design and Planning* (New York: Routledge, 2010), 128.

¹⁹ Protzen and Harris, *The Universe of Design: Horst Rittel's Theories of Design and Planning*.

within these complex conflict environments. Within military activities, 'design' may refer to operational planning design or military campaign design in Joint and Coalition forces. It may refer to Service-specific methodologies that use 'design' or merely imply it through epistemological decisions. Outside military activities, design may be realized through industrial design applications that form the tools, things and capabilities of all military forces, and there is also the highly influential 'human-centric design' movement that addresses user experiences to include military professionals. With so many design disciplines, fields, doctrines, practices, vocabularies, ontologies, epistemologies, and methodologies, the mere mention of the word 'design' might trigger an avalanche of different emotions as well as reactions.

It is at the interaction of military design, industrial design and human-centric design where one observes unique inter-disciplinary "interplay" as well as overlap (commonality) and tensions (contradiction, paradox, and incommensurability).²⁰ This two-part graphic attempts to frame several of the major interplays, overlaps and tensions. By intentionally using primary colors for this Venn diagram, the secondary colors act as the design discipline zones of interaction. The central "tertiary zone" of all three interacting is really the closest to daily reality for militaries in conflicts, and also the most uncertain and ambiguous.

Figure 1: Design Discipline Interplay, Overlap and Tension



²⁰ Majken Schultz and Mary Jo Hatch, "Living with Multiple Paradigms: The Case of Paradigm Interplay in Organizational Culture Studies," *Academy of Management Review* 21, no. 2 (1996): 529–57; Dennis Gioia and Evelyn Pitre, "Multiparadigm Perspectives on Theory Building," *Academy of Management Review* 15, no. 4 (1990): 584–602; Aaron Jackson, "Towards a Multi-Paradigmatic Methodology for Military Planning: An Initial Toolkit," *The Archipelago of Design Blogs* (blog), March 4, 2018, <http://militaryepistemology.com/multiparadigm2018/>; Marianne Lewis and Andrew Grimes, "Metatriangulation: Building Theory From Multiple Paradigms," *Academy of Management Review* 24, no. 4 (1999): 672–90; Marianne Lewis and Mihaela Kelemen, "Multiparadigm Inquiry: Exploring Organizational Pluralism and Paradox," *Human Relations* 55, no. 2 (2002): 251–75.

The Industrial Design Movement: From the Victorian Era into World Wars...

To briefly explain what military design is, and why militaries in the 21st century are experimenting with a different sort of design discipline does require some explanation of other forms of design. We need to explain how different design disciplines overlap, operate in tension, and also interplay across other design modes. There also should be sufficient explanation as to why those other design forms and methodologies alone are insufficient to expressing this emergent military need. Industrial design is the earliest of what can be recognized as modern design where classical elements of human creativity and the manipulation of objects and ideas for advantage are done in the modern era. Here, the modern era is defined as when professional schools and set methodologies agreed upon by communities of practice first manifest in societies through doctrine, literature, education, and training.²¹

This was a dramatic shift from military apprenticeship and local contexts towards the factory process of uniform, precise, and repeatable outputs for professionals of various schools and disciplines.²² With the rise of the Industrial Revolution, the expansion of ideas in the Age of Enlightenment, and the increased exchange of ideas through literacy and printing, the industrial design movement reflected the first modern design process. Shoes began to move from a tailored item repaired over a lifetime to a standardized yet cheaper one that when worn out was discarded and replaced with another.

In one world, the quality of your goods reflected your access to artisans as well as the speed of individual production, where in the other world the engineer could take the artist's unique yet slowly produced and locally available item and mass produce them on an industrial scale. To do this, some artistic elements were lost in order to gain the advantages of mass production. Within this new world of increased complexity and interdependency, industrial design created uniformity as well as diversity, where reliability and predictability provided the comforting illusion of a rather stable future.²³

High-quality things no longer required access to a skilled artisan, nor the lengthy period of time and travel to gain access to these goods. Further, the methods of production could be standardized in quantifiable ways so that schools and best practices ensured the next year group of laborers could create and even improve upon the current outputs. There is a natural science emphasis in this sort of design where mathematics, Newtonian physics, biology, engineering, and chemistry are essential for creating new combinations of things and human ideas in ways that are useful for manipulating their environment as well as cost effective, reliable and readily available through mass production.

From a managerial perspective, the linear and reductionist approach to decision-making and problem solving is best appreciated in a Taylorism school of management

²¹ Mader, *In Pursuit of Conceptual Excellence: The Evolution of British Military-Strategic Doctrine in the Post-Cold War Era. 1989-2002*, p. 28; Jackson, *The Roots of Military Doctrine: Change and Continuity in Understanding the Practice of Warfare*, p. 10-15.

²² Jorgen Nielsen and Lars Andreasen, "Design and Co-Design of Project-Organized Studies," in *Situated Design Methods*, ed. Jesper Simonsen et al. (London: MIT Press, 2014), 43–76.

²³ Victor Papanek, *Design for the Real World: Human Ecology and Social Change* (New York: Pantheon Books, 1971), p. xvi.

for this Machine Age of Industrial Design.²⁴ Humans went from individual and divergent groups of local artisans towards uniform and reliable cogs in a vast machine, capable of simplifying difficult labor tasks into a set and sequential series of steps that could be further reduced down in an assembly line methodology.

Gains in efficiency could be accomplished through reducing and further simplifying human actions within the process to maximize increased production speed, uniformity, and reliability. From Industrial Design, the modern military organization applied their decision-making methodology for organizing and acting in war, while also incorporating the organizational form of the Napoleonic Staff structure. Each staff officer under the commander would specialize in a specific and interrelated military field, where like an assembly line the staff would simplify complex problems through analysis, the language and metaphors of natural sciences, and reverse engineer a strategy or tactical plan through an ends-ways-means construct.²⁵ This union continues to dominate military organizations to this day, in part due to the perceived historic success of this methodology in major wars of the 19th and 20th centuries that mobilized entire nations and coalitions of nations in total wars of annihilation.

The Civilian Design Movement: Human-Centric Design and the Late 1950s...

As this is a military design discussion, a comparison of industrial, human-centric and military design is framed here decidedly from a military perspective. Militaries, while gazing outwards beyond its own ranks, seeks to understand 'design' through a military lens. Due to this, the design done for purposes beyond or outside of military considerations might be termed 'civilian design' if only by military professionals. This of course acknowledges that civilians doing design would never refer to it as 'civilian design', that civilian forms of design clearly overlap, interact and are in tension with military applications within the context of war, and that a frame attempting to explain 'military design' must figure out some way to express various forms of design that flourish in non-military contexts. *Again, the very term 'design' is problematic.*

Architect Frank Lloyd Wright said, "Physicians can bury their mistakes; architects can only advise his client to plant vines". This is a useful philosophical observation on the context in which creativity, experimentation, failure and change occur across various disciplines. Design occurs in the highly objective and contextual forms constructing part of reality, while design also occurs in the rather subjective and abstract extensions interconnecting these forms that provide a social construction of reality for humanity.²⁶ The patient that dies during the learning cycle of a medical doctor is a tragedy, yet that body is buried quite literally as well as metaphorically.

When a discipline's failures can be addressed or ignored, that discipline might hold to outdated or irrelevant practices for longer periods of time based on ritualization, indoctrination, lack of critical self-reflection or lack of imagination beyond the confines of

²⁴ Stephen Waring, *Taylorism Transformed: Scientific Management Theory since 1945* (Chapel Hill, North Carolina: The University of North Carolina Press, 1991); Stephen Waring, "Taylorism and Beyond: Bureaucracy and Its Discontents," in *Taylorism Transformed: Scientific Management Theory since 1945* (Chapel Hill, North Carolina: The University of North Carolina Press, 1991), 9–19.

²⁵ Christopher Papparone, *The Sociology of Military Science: Prospects for Postinstitutional Military Design* (New York: Bloomsbury Academic Publishing, 2013): 1-35.

²⁶ Peter Berger and Thomas Luckmann, *The Social Construction of Reality: A Treatise in the Sociology of Knowledge*, First Anchor Books Edition, 1967 (New York: Anchor Books, 1966).

one's institutional frame.²⁷ Thus, doctors can either rapidly disrupt or challenge the institution if bodies pile up, or simply bury them as well as any institutional need to address the frequency of failure. In military organizations, staffs frequently say, "the enemy has a vote" in order to retain relevance of any methodology applied that fails in execution. This is a way for militaries to 'bury the bodies' of failed intelligence predictions regardless of whether the error was in the practitioner or in the practice itself.

Wright offers that architects must plant bushes to hide the bodies they cannot bury...that depending on the discipline and how you design within reality, your successes and failures may or may not be more open to critical self-reflection and a need for change. Industrial designers, in quite a broad and over-simplifying perspective, might bury dead bodies in design easier than an architect or city planner might. A poorly designed automobile lasts one production year and is lost to the junkyards (vehicle graveyards) of the world, yet a poorly designed football stadium or city hospital remains there for decades and has to be dealt with.

The term 'human-centric design' is ideally a sufficient label for what military professionals might see as a civilian form of design, however 'human-centric design' is infrequently used even within civilian practices in part due to a diversity of design methodologies, civilian institutional and self-branded interests, and the perpetual inventive nature of the design movement itself. Today, there are many methodologies of design with terms such as "Stanford D-School", "AGILE", "ADDIE", and many others.

These civilian design methodologies use a diverse range of concepts, methods, and language. They often seek different outputs, while still generally falling within the broad frame that human-centric design set out to define in the late 1950s and early 1960s in Europe and North America.²⁸ During this period, the success of Industrial Design became increasingly problematic due to exceptional design outputs not accomplishing their desired goals. Designers were not realizing the highly subjective qualities of creation within those objective forms that are personal and require an immediate experience.²⁹ Industrial designers might create a better automobile that in every way was superior to the older model, yet that new model might not sell and cause the company to go bankrupt, often for complex reasons well beyond the narrow perimeters of what defined a superior vehicle.

One useful example concerns the Stock Market crash of 1929. It triggered the end of an era of increasingly opulent automobiles due to the collapse of many first world economies, and most luxury vehicle companies quickly died out or adapted in the 1930s when they could not sell vehicles that had previously been in high demand. This also changed how cars were made, with the stretched sheet-metal curved look of vehicles of the 1930s occurring largely to decrease production costs and reduce artisan requirements for opulent and complex vehicle components. Things were changing, and while industrial designers could build a vastly superior vehicle, they had to be able to

²⁷ Builder, *The Masks of War: American Military Styles in Strategy and Analysis*; Nagl, *Learning to Eat Soup with a Knife: Counterinsurgency Lessons from Malaya and Vietnam*.

²⁸ Papanek, *Design for the Real World: Human Ecology and Social Change*; Protzen and Harris, *The Universe of Design: Horst Rittel's Theories of Design and Planning*; Klaus Krippendorff, "Principles of Design and a Trajectory of Artificiality," *Product Development & Management Association* 28 (2011): 411–18; Christopher Alexander, *Notes on the Synthesis of Form* (Cambridge, Massachusetts: Harvard University Press, 1964).

²⁹ Bernard Tschumi, *Architecture and Disjunction* (Cambridge, Massachusetts: MIT Press, 1997), 51.

empathize with the consumer and create a user experience that might be in paradox or even in conflict with some core tenants of Industrial Design.

This empathy-based movement sought to advance design towards a 'human-centric' (HCD) methodology that considered the user experience; that products and even ideas and experiences that the user might have when engaging with the product had to be considered differently.³⁰ Further, it was not enough to reduce societies down into individual users; designers had to consider socially complex groups of different stakeholders and vastly different interests as well as perspectives.³¹ When industrial design might produce the perfect new apartment complex in the downtown area, human-centric designers would need to consider the local and even wide-scale impacts of this new apartment complex upon the city and the occupants.³² How might traffic impact that area, or school requirements, or whether the existing population was now disenfranchised due to the production of this new complex.

In HCD, the engineers of Industrial Design meet the City Planners of HCD, and empathy becomes a key process to understand why the perfectly designed building remains empty of tenants. HCD looked to improve the user experience, whether by changing things, conditions those things were in, ideas concerning the thing, or feelings of the user. In the late 1950s onwards, academia began formalizing a set human-centric design methodology (later methodologies and various schools of thought) that began to incorporate inter-disciplinary relationships well beyond the natural science components of Industrial Design.³³ While natural science elements remained critical to producing superior design outputs, the application of complexity theory, general systems theory, sociology, psychology, and other 'social science' disciplines became increasingly relevant in a emergent stew of HCD methodologies, language, and practical applications.³⁴

Moving beyond the set factory approach of the Taylorism School of Management, HCD methodologies required post-Taylorism considerations. While an assembly line worker might mathematically have the ability to produce more items if given exactly four rest breaks per eight hour shift at 15 minutes per break, sociologists might reveal that longer breaks resulted paradoxically in increased worker productivity. Or, placing plants and more outdoor lighting produced workers that required fewer sick days, while requiring a factory to invest in some adjustments in the building configuration. In many of these applications, a different managerial approach was

³⁰ Herbert Simon, *The Sciences of the Artificial*, Third Edition (Cambridge, Massachusetts: The MIT Press, 1996), 111–112.

³¹ Bruno Munari, *Design as Art* (New York: Penguin Books, 1966), 27–36; Papanek, *Design for the Real World: Human Ecology and Social Change*.

³² Munari, *Design as Art*, 101–109.

³³ Protzen and Harris, *The Universe of Design: Horst Rittel's Theories of Design and Planning*; Alexander, *Notes on the Synthesis of Form*; Harold Nelson and Erik Stolterman, *The Design Way*, Second (Cambridge, Massachusetts: The MIT Press, 2014).

³⁴ Krippendorff, "Principles of Design and a Trajectory of Artificiality"; Visser, "Schön: Design as a Reflective Practice"; John Gero and Udo Kannengiesser, "An Ontology of Donald Schön's Reflection in Designing" (Key Centre of Design Computing and Cognition, University of Sydney, undated); Janin Hadlaw, "The London Underground Map: Imagining Modern Time and Space," *Design Issues* 19, no. 1 (winter 2003): 25–35.

required that disrupted or challenged the dominant Taylorism's reductionist model, and frequently involved empathy as well as social considerations.³⁵

For military applications, HCD has not only improved the industrial design applications of military hardware for increased efficiencies on battlefields and greater lethality, but for empathetic concerns things such as non-lethal systems that accomplish entirely different effects and are often in paradox with improving the lethality of other military tools and techniques. Few would argue that nonlethal applications have value in the modern battlefield, yet HCD is oriented towards improving the user experience, and not necessarily for changing a complex environment or an organization of users/consumers. Doing so might render the new product incompatible or irrelevant if the users or the environment are transformed into non-consumers and users of other products/experiences.

The Military Design Movement: 1990s and Onward...

Militaries since the end of the 20th Century have grown increasingly frustrated with traditional military decision-making methodologies that are largely linear, mechanical, and systematic process of nesting tactical manipulations within faulty strategic frames.³⁶ What demonstrated effectiveness in the past is projected forward, with an obsession towards causal logics, analytical optimization, and convergence over divergence. Many of these processes can be found in the recent example of a military unit in Afghanistan that came upon a remote village where the only drinking water well was a few miles away from the village itself.³⁷ Modifying the Frank Lloyd Wright architectural quote from earlier, "while architects advise clients to plan vines, the military digs wells that increase village thirst."

In that Afghan village each day the women of that village would trek across the rough terrain in groups to return with jugs of water. The unit immediately set about investing reconstruction funds to dig a new well much closer to the village, which was embraced by the village elder males as a great investment. Soon after, that new well was sabotaged nightly by unknown assailants. The unit set about capturing these suspected terrorists, but discovered that it was the local Afghan women doing it...there were no terrorists in the area at all. It turns out that the women cherished those long walks as time away from the male-dominated village social structure, where the women could talk and behave more freely away from male supervision and control. This new well disrupted that and triggered entirely new problems that were incomprehensible to the military unit attempting to interpret reality through a decidedly western lens. Further, from a HCD perspective of empathy, westerners do desire improved user experiences such as speed, ease of access, lower costs, and other concepts associated with the new well location. Yet paradoxically, the social construction of how that village behaves and inter-related was not easily reducible to linear cause and effect.

Thus, in the series of design metaphors offered here where the artisans met engineers, and engineers then met the city planners, now the city planners meet

³⁵ Alexander, *Notes on the Synthesis of Form*, 28–42; Papanek, *Design for the Real World: Human Ecology and Social Change*, 244–257.

³⁶ Shimon Naveh, *In Pursuit of Military Excellence: The Evolution of Operational Theory* (New York: Frank Cass, 1997), p. xiii.

³⁷ Ann Jones, "Woman to Woman in Afghanistan: Female Engagement Teams Joint the Counterinsurgency," *The Nation*, October 27, 2010, <https://www.thenation.com/article/woman-woman-afghanistan/>.

disgruntled military practitioners in complex, emergent contexts unlike past war periods. Arguably, military contexts are inherently distinct from all other environments, and while the military uses and generates business, the military itself is not a business, nor is a conflict environment necessarily the absence of business conditions. If anything, a military context is the chaotic and transformative conditions where successful practices occurring in non-military contexts tend to function differently or even paradoxically while occurring within the military context.

When addressing the most significant military challenges in the 21st century, 'single paradigm blindness' was listed first. This is where militaries employ one paradigm to generate subsequent methodologies to decision-making and problem solving that are non-reflective; the content can be critiqued and transformed but the form that generates that content is immune and invisible to query.³⁸ Complexity theorist Russell Ackoff captures this with, "the more we do the wrong thing right, the wronger we get".³⁹ This becomes the never-ending cycle of military strategies that get extremely proficient at doing the wrong things in increasingly better ways...resulting in a military being quite good at doing the wrong things over and over.

As the military improves and assesses the success at improving their execution of the wrong strategies, it becomes increasingly difficult to challenge the form itself- the awareness that it might be doing the wrong thing right. A significant reason for this is an inability to challenge the content as well as the form in design practice; this requires design theory to apply multi-paradigm awareness and trans-disciplinary design practice.⁴⁰

A military force must be aware of its own paradigm, the limits of those concepts and why one artificially prevents itself cognitively from considering complexity and humanity beyond the barriers it establishes before it begins to act. The scope and limits of a single mind or even a group of minds is always limited- one cannot snap one's fingers and consider everything nor can a person or organization prepare or predict for all possibilities. Everyone walks through this world with a frame, often a collectively shared one that is maintained with shared language, the metaphors behind that language and shared concepts.⁴¹ There are shared logics, and at deeper philosophical levels within collective paradigms, core beliefs on what reality is (ontology) as well as how one knows reality functions (epistemology) so that people can construct and share knowledge productively.⁴²

³⁸ Weick, "Reflections: Change Agents As Change Poets- On Reconnecting Flux and Hunches"; Papparone and Reed, "The Reflective Military Practitioner: How Military Professionals Think in Action"; Beaulieu-Brossard and Dufort, "Introduction to the Conference: The Rise of Reflective Military Practitioners"; Gary Weaver and Dennis Gioia, "Paradigms Lost: Incommensurability vs Structurationist Inquiry," *Organization Studies* 15, no. 4 (1994): 565-90.

³⁹ Russell Ackoff, *Creating the Corporate Future* (New York: John Wiley & Sons, Inc, 1981).

⁴⁰ Lewis and Grimes, "Metatriangulation: Building Theory From Multiple Paradigms"; Schultz and Hatch, "Living with Multiple Paradigms: The Case of Paradigm Interplay in Organizational Culture Studies"; Papparone, *The Sociology of Military Science: Prospects for Postinstitutional Military Design*.

⁴¹ Berger and Luckmann, *The Social Construction of Reality: A Treatise in the Sociology of Knowledge*.

⁴² Burrell and Morgan, *Sociological Paradigms and Organisational Analysis: Elements of the Sociology of Corporate Life*.

The First Formal Military Design Methodology: Israeli SOD

Military design first emerged in the late 1990s with the Israeli Defense Forces largely led by Brigadier General (retired) Shimon Naveh and a defense think tank.⁴³ This eclectic group of Israeli military professionals and academics began to build a multi-disciplinary design methodology that did not seek to improve user experience or products for the end user. Instead, they considered how to potentially change the organizations themselves, and how those organizations interacted with and influenced the complex military environments that they were challenged to operate within for political and institutional purposes.⁴⁴

Industrial design would shape the tools themselves as used by the military, human-centric design might improve user experiences while using those tools for particular missions, and military design would consider how a military unit is thinking about why they are even performing the actions requiring those tools and how a complex adaptive system might respond in an emergent and nonlinear manner with those tools within it. Spawning out from the IDF as well as growing academic fields of complexity science, postmodern philosophy, interpretive sociology, and elsewhere, the American military as well as Australian, Canadian and now across European militaries have military design movements emerging.⁴⁵

Military design is trans-disciplinary, where natural science concepts interplay, overlap and disruptively engage with complexity theory, eastern philosophy, postmodern concepts, social sciences and other fields and disciplines. The dominance of the centralized hierarchical form and the military Napoleonic staff structure is slowly crumbling to disruptive alternatives. Military design interacts with traditional military planning as well as with industrial design and human-centric design. Yet to do this,

⁴³ Ofra Gracier, "Self Disruption: Seizing the High Ground of Systemic Operational Design (SOD)," *Journal of Military and Strategic Studies* 17, no. 4 (June 2017): 21–37; Ofra Gracier, "Between Teaching and Learning: What Lessons Could the Israeli Doctrine Learn from the 2006 Lebanon War?," *Experticia Militar*, October 2017, 22–29; Shimon Naveh, Interview with BG (Ret.) Shimon Naveh, digital transcript, November 1, 2007; Eyal Weizman, *Hollow Land: Israel's Architecture of Occupation* (New York: Verso, 2007), 210–218.

⁴⁴ Philippe Beaulieu-Brossard, "Systemic Operational Design or How I Began to Worry about the Dual Use of Critical Concepts" (University of Ottawa, Canada, June 1, 2015); William Sorrells et al., "Systemic Operational Design: An Introduction" (Fort Leavenworth, Kansas, May 26, 2005), ATZL-SWV, OMB No. 0704-0188; Ketti Davison, "Systemic Operational Design (SOD): Gaining and Maintaining the Cognitive Initiative" (US Army School of Advanced Military Studies, Fort Leavenworth, Kansas, March 2006).

⁴⁵ Jackson, "Towards a Multi-Paradigmatic Methodology for Military Planning: An Initial Toolkit"; Paul Mitchell, "Stumbling into Design: Action Experiments in Professional Military Education at Canadian Forces College," *Journal of Military and Strategic Studies* 17, no. 4 (June 2017): 84–102; Ben Zweibelson et al., "The Emergent Art of Military Design: Swedish Armed Forces and the Contemporary Security Environment," *The Royal Swedish Academy of War Sciences: Proceedings and Journal*, no. 3 (2017); Przemyslaw Pazdziorek, *Wojskowa myśl operacyjna w konfliktach zbrojnych przełomu XX i XXI wieku* (Warsaw, Poland: Adam Marshal, 2016); Beaulieu-Brossard and Dufort, "Conclusion: Researching the Reflexive Turn in Military Affairs and Strategic Studies"; Ben Zweibelson, "'Design' Goes Dutch: Royal Netherlands Army Consideration for Unconventional Planning and Sensemaking," *Royal Netherlands Atlantisch Perspectief Journal* 29, no. 6 (2015): 31–35.

military design require military professionals to receive sophisticated education and work for leaders that foster the right conditions and environment for military design to occur.⁴⁶

Currently, militaries are uncertain on who to provide this education to, when in the military career it is most beneficial, what the actual design concepts, language and methodology (or methodologies) ought to be, and how to incorporate it across the legacy military planning system and organizational form (centralized hierarchy) so that disruptive thinking benefits the organization instead of damaging it.⁴⁷

Design Discipline Interplay, Overlap and Tensions:

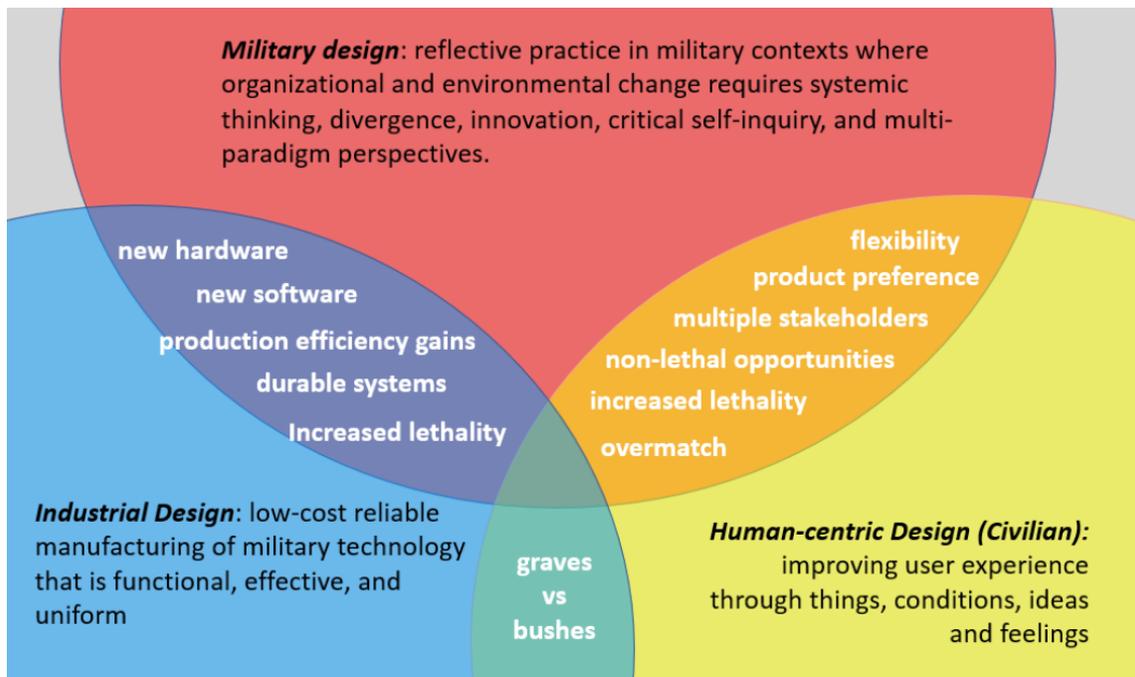
In the below graphic, industrial, human-centric, and military design disciplines are arrayed within a Venn diagram using primary colors as a metaphor to illustrate cross-disciplinary design interactions. Here, the various tensions, overlap as well as interplay are presented in one way to frame this broad and multi-disciplinary design community of practice concerning military applications.

Referring to the Venn diagram below, the purple zone is the interaction between industrial design and military design, where new hardware as well as software provide that necessary combination of new concepts and tools. Militaries invest in manufacturing process improvement methodologies (Six Sigma for example) and quality management processes to improve the interplay between industrial design processes and military design emergent needs.

⁴⁶ Ben Zweibelson, Aaron Jackson, and Simon Bernard, "Teachers, Leave Them Kids Alone: Debating Two Approaches for Design Education in Military Organizations," *Blue Knight Review* Special Issue 2018, no. 2 (January 27, 2018), <http://www.cmrsj-rmcsj.forces.gc.ca/cb-bk/art-art/2018/art-art-2018-4-eng.asp>.

⁴⁷ Ben Zweibelson et al., *Over the Horizon Podcast 5 – Designing Future Security: An International Roundtable on the Military Design Movement*, iTunes or Soundcloud, Over the Horizon Podcast Series, accessed February 12, 2018, <https://overthehorizonmdos.com/2018/02/12/podcast-5-designing-future-security-an-international-roundtable-on-the-military-design-movement/>; Christopher Papparone, "Design and the Prospects of a Design Ethic," *Small Wars Journal*, March 4, 2011, 1–8; Martin, "Deniers of 'The Truth': Why an Agnostic Approach to Warfare Is Key."

Figure 2: Design Interdisciplinary Tensions, Overlap and Interplay



The orange zone between military design and human-centric design features flexibility in design applications, where product preferences weigh in for marketing and consumption as well as organizational identity. Here, the various camouflage patterns between services offers a useful example. The U.S. Army initially sought the USMC digital pattern, however the USMC wanted to keep that pattern specific to Marines only as a way to distinguish Marines from other service members. Thus, there is a tension between the effectiveness of camouflage with unit or service-specific goals associated with identity and ritual. If the USMC digital pattern was possibly the superior camouflage pattern, the desire to keep that service-exclusive might cause the US Army to adapt an inferior pattern in order to pursue similar service identity concerns.

For an interesting intersection between HCD and military design, consider non-lethal opportunities in equipment, techniques and strategies. The non-lethal interest by land forces increased significantly in the mid-2000s due largely to the insurgencies in Iraq and Afghanistan, where militaries learned that they could not “kill their way out” of those missions. General McChrystal’s famous “10-2 equals 12” COIN slogan helped illuminate this tension, where non-lethal activities finally became seen as peer equivalents in military operations with the traditionally dominant lethal line of effort. When the ability to accomplish significant military aims in a conflict environment are reached with non-lethal activities instead of lethal ones is a strong example where empathy and human-centric design along with military design forges an important relationship.

The central overlapping zone (creating the brownish blend of all primary colors) where all three design processes occur simultaneously is perhaps the most significant design context for us to consider. In today’s complex and amorphous conflict zones, a blending and emergent stew of military design, industrial design and human-centric

design continue to grow like crab grass, weeds, or potato roots.⁴⁸ There is no center; there is no location that cannot combine and interact with another....and if one attempts to sever one part it only creates more opportunity to spread in a new direction. Welcome to rhizome-inspired warfare.

Broad Overview of Military Design Movements Today:

There are many different military design movements out there currently, with an interesting tangled web of interrelationships, influences, shared concepts, as well as unique and sometimes quite exclusive concepts paired with cultural elements of that military organization and how it prefers to interact with complex reality.

Industrial and human-centric design provided significant groundwork and inspiration for military design through the 20th century. In the late 1990s, the Israeli Defense Force developed the first formal military design methodology as well as the deliberate integration of this concept into practice prior to the 2006 Lebanon War. Termed 'systemic operational design' or 'SOD', it was a challenging if not rather cryptic combination of postmodern philosophy, non-western concepts, complexity theory, and dense poetic language. This sophisticated form of military design tended to confuse many that attempted to interpret it from inside as well as outside the IDF.⁴⁹

SOD was quite disruptive and unique; militaries such as the American and Australian Armies took notice as their traditional counter-insurgency problem-solving methodologies proved insufficient or irrelevant in the first decade of the 21st century in Iraq and Afghanistan. Soon, the Australian and American Armies began developing their own design methods after experimenting with limited forms of Israeli SOD.⁵⁰ The integration of complexity theory into military practice also influenced these institutions in similar ways. The American Army's interpretation of design remains quite problematic due to the indoctrination of it as well as the reductionism into a uniform planning tool shackled to the existing dominant planning techniques.⁵¹ The British took a slightly nuanced approach that lacks many design terms as well as even a set methodology,

⁴⁸ Gilles Deleuze and Felix Guattari, *A Thousand Plateaus*, trans. Brian Massumi (Minneapolis: University of Minnesota Press, 1987); Davison, "Systemic Operational Design (SOD): Gaining and Maintaining the Cognitive Initiative"; Patricia Pisters, ed., *Micropolitics of Media Culture: Reading the Rhizomes of Deleuze and Guattari* (Amsterdam: Amsterdam University Press, 2001).

⁴⁹ Weizman, *Hollow Land: Israel's Architecture of Occupation*, 185–220; Eyal Weizman, "Walking through Walls: Soldiers as Architects in the Israeli/Palestinian Conflict" (Arxipelago of Exception: Sovereignities of extraterritoriality, CCCB, Barcelona, Spain: self-published, 2005); Gracier, "Between Teaching and Learning: What Lessons Could the Israeli Doctrine Learn from the 2006 Lebanon War?"

⁵⁰ Alex Ryan, "A Personal Reflection on Introducing Design to the U.S. Army," *The Medium* (blog), November 4, 2016, <https://medium.com/the-overlap/a-personal-reflection-on-introducing-design-to-the-u-s-army-3f8bd76adcb2>; Alice Butler-Smith, "Operational Art to Systemic Thought: Unity of Military Thought," in *Cluster 3* (Hybrid Warfare: New Ontologies and Epistemologies in Armed Forces, Canadian Forces College, Toronto, Canada: unpublished- Canadian Forces College internal document, 2016), 1–5; Philippe Beaulieu-Brossard, "Encountering Nomads in Israel Defense Forces and Beyond" (University of Ottawa, Canada, 2016); Shimon Naveh, "The Australian SOD Expedition: A Report on Operational Learning" (Unpublished manuscript, December 10, 2010).

⁵¹ Shimon Naveh, "Beware of the Power of the Dark Side- The Inevitable Coupling of Doctrine and Design", Interview by Ofra Graicer, *Experticia Militar* (July-October 2017).

however British military doctrine on decision-making, understanding and complexity from 2011 through the present began to integrate many design processes, although often in tacit and implicit ways.⁵²

In the last decade, military design has emerged as an international movement where European militaries such as Poland, Sweden, Norway, Romania, the Netherlands, Hungary and others are developing or experimenting with some sort of military design activity. Canada in particular has seized the design initiative for North America by blending multiple design methods from across the military and HCD programs in a custom annual design educational module at their Canadian Forces College.⁵³ There are military design conferences, formal academic programs from academy level to war colleges, entire special edition journals dedicated to military design, podcasts, blogs, webpages, social media sites, and even military design books. Within the larger international military community of practice, modern (often termed western) Armed Forces represent well trained and resourced professionals. Nations that can afford them frequently place those military professionals into some of the most demanding and complex environments imaginable.

Military Design: Enabling Innovation and Reflective Practice:

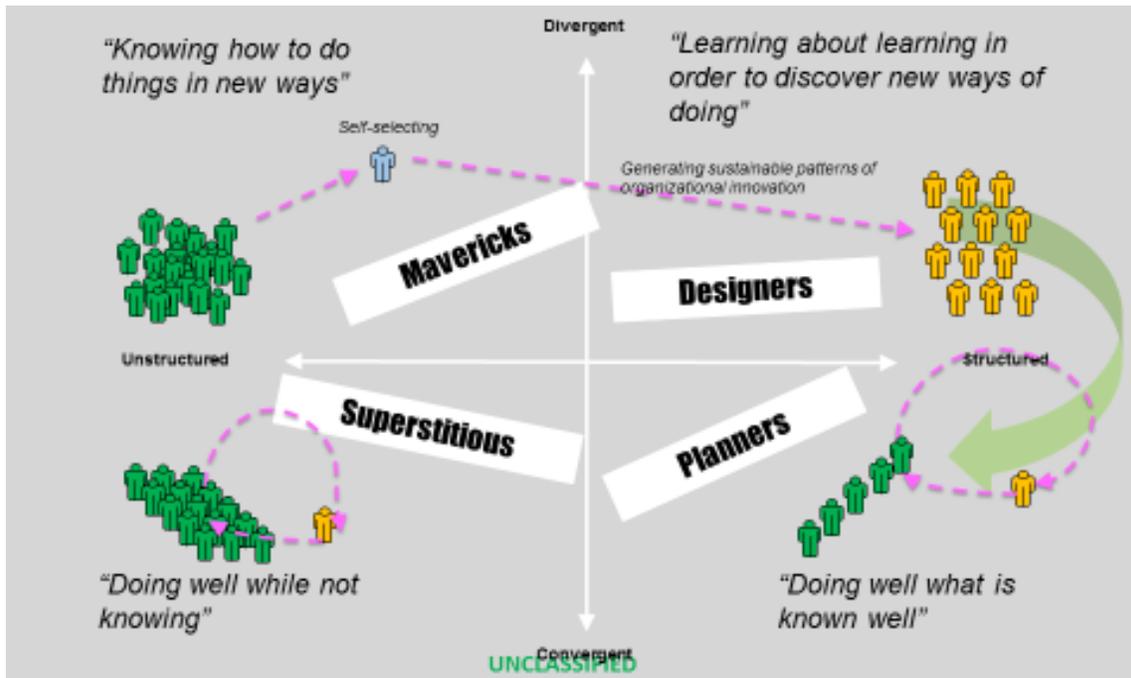
Military organizations rely upon divergent and convergent cognitive processes. Further, militaries operate in structured (formal) and unstructured (informal) ways. When maverick military thinkers are able to innovate and greatly influence the transformation of the military institution such as when a Napoleon or other visionary arrives on the stage, we place them in the upper left quadrant. These rare individuals exist in all disciplines and are the game-changers of the world, yet they are random and infrequent.

One cannot simply wait around for the next brilliant leader or thinker to arrive, and often when they do the larger institution is unable to recognize them at first or realize the change they are ushering in. Militaries are better established to groom professionals to thrive in the lower right quadrant in the below graphic, where the formal military education system generates convergent thinkers able to produce uniform, reliable and predictive models that reinforce shared values as well as institutionally sanctioned best practices. Most, although not all military design programs are really trying to create a new group of military professionals that thrive in divergent thinking processes.

⁵² Ministry of Defence Development, Concepts and Doctrine Centre, *Joint Doctrine Publication 04: Understanding* (Shrivenham, Swindon, United Kingdom: Ministry of Defence, Shrivenham, Wiltshire, United Kingdom, 2010); United Kingdom Ministry of Defence, *Joint Doctrine Note 3/11: Decision-Making and Problem Solving: Human and Organisational Factors* (Shrivenham, Wiltshire, United Kingdom: Development, Concepts and Doctrine Section of the United Kingdom Defence Staff, 2011), www.mod.uk/dcdc.

⁵³ Paul Mitchell, "Stumbling into Design: Teaching Operational Warfare for Small Militaries in Senior Professional Military Education" (Canadian Forces College, Toronto, Canada, 2015), https://www.doria.fi/bitstream/handle/10024/117634/MITCHELL%20Paul_poster_Designing%20Design,%20Teaching%20Strategy%20and%20Operations%20for%20Small%20Militaries.pdf?sequence=2.

Figure 3: Military Design- Enabling Innovation and Reflective Practice



To generate large enough groups of these thinkers, a military should structure it with some sort of professional school as well as a methodology, specialized language and concepts so that this new design ‘community of practice’ can communicate as well as innovate. Further, they must complete the illustrated green arrow; they must enable and assist the mavericks and visionaries of a military institution so that military planners can understand the oncoming change, and implement it productively into the set practices of the larger military institution. Lastly, designers as reflective practitioners can see when some planning practices become canonized or ritualized into superstition, where the original logic of a military practice is lost and the action is an unstructured and unquestioned institutional behavior that actually harms the organization.⁵⁴

Conclusion:

The military design movement is confronting the biggest institutional and contextual challenges of the 21st century as human civilization enters this post-Industrial World of increased complexity and sophistication. Previous linear and rather mechanical

⁵⁴ For example, in the military the physical fitness belt is the hallmark of ritualized behavior in that originally, it was used in low-visibility conditions to prevent soldiers from being struck by vehicles. It now has become an item of conformity on many military bases in combat zones, where Sergeants Majors and senior leaders patrol the barracks ready to correct any personnel not wearing their PT belt in broad daylight because it is part of the established uniform...even though it does not prevent vehicle accidents and potentially increase other risks in combat zones. Rituals are useful until they are not; except the nature of a ritual is it becomes off-limits for critical inquiry.

decision-making methodologies have run their course, yet linger within military doctrine as well as culturally and through ritualization within all modern militaries. Militaries are frequently unable to drop favored tools both cognitively and literally, and more significantly militaries lack the reflective practice necessary to appreciate when these mental models are distorting the very understanding of reality as it emerges.

Of the evolution of humanity's increasingly sophisticated engagement with the tangible and intangible, the tacit and the explicit, and the physical and the socially constructed, the flow of ideas and the manipulation of objects to humanity's advantage has been expressed in various design disciplines. Industrial design commenced with the Industrial Revolution and the collision of skilled artisans with mass manufacturing, while human-centric design later emerged from the paradox of creating highly effective designs that failed to account for deeply contextual, subjective and social aspects of an increasingly complex reality. In the last generation of perpetual military conflict across the globe, militaries have gradually and often independently developed their own methodology of military design that seeks to enable divergent thinking, critical reflection, and set conditions for innovation within decidedly military contexts. Meanwhile, the very term 'design' has now become a confusing blur of vastly different meanings, associations, tribes and affiliations.

When framing the challenges for military leadership attempting to work design and traditional planning into a cohesive organizational rhythm, I offer the following metaphor. Consider the tensions confronting military leadership with that of the demands of running an orchestra performance while also fostering musical innovation in a jazz improvisation session across the street from the orchestra. The conductor uses sheet music, rehearsals, and convergent processes to move the orchestra members towards a highly reliable, uniform and predictable organization that prepares and performs beautiful music to concert-goers. Yet the conductor is also the composer, and when seeking inspiration for the next great symphony to inspire concert-goers without simply repeating previous works, the conductor must depart the concert hall.

If across the street from the concert hall there was a small jazz club, outside might sit some musicians jamming together without any sheet music or conductor at all. The musicians in this context create, experiment, fail, and develop novel sounds towards contributing something innovative that challenges and even disrupts the audience in order to express different ideas in meaningful ways. It is here where the conductor visits to experience divergence, experimentation, and cycles of critical and creative interactions. When the improvisation strikes a sound that inspires the conductor, he or she may return to writing a new symphony to direct the orchestra inside the concert hall. This is the tension as well as the iterative process that a military leader must cycle through concerning military planning and military design.

While there are many options for military education, training, schooling and practice on the linear and mechanical planning side of the street, militaries today lack those same options on the innovation side of this metaphor. The broader military design movement is a generation-long effort to create new methodological structures for military education, practice, and doctrine for filling these voids as well as potentially disrupting traditional military forms that no longer are relevant or sufficient for today's complex challenges. Unlike most civilian counterparts, the military professional faces additional institutional challenges in the strong military cultural impacts upon the institution, the preferred military paradigm, and the gradual ritualization of best practices as well as the dominance of objectivity-centric and analytical optimization over alternatives. It is within these tensions and complex web of institutional challenges that current military design

Supplemental White Paper for Keynote Lecture presented at SPADE Conference,
Copenhagen, Denmark on June 20th, 2018; property of the author

movements are attempting, with some more useful than others, to transform militaries into relevant and flexible organizations able to operate within 21st Century emergent contexts.