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Editorial

It has been an intense and exhilarating time for us recently, commemorating not just Singapore Armed Forces (SAF) Day on 1st July 2018 but, commemorating our nation's 53rd birthday on 9th August 2018. Here, all Singaporeans come together to celebrate, enjoying the independence that had been so hard won for us by a strong and vigilant SAF, who had worked hard to keep Singapore safe and defend our sovereignty. However, amidst the increasingly complex and volatile external environment, we need to be watchful and alert to potential threats around us, one of the more challenging ones being that of terrorism. As our Minister for Defence, Dr Ng Eng Heng said at the Overseas Service Medal Presentation Ceremony on 27th Jul 2018, "The battle against terrorism for the SAF will be a long one, and we must be prepared to go the distance. Our strategy against terrorism remains the same since the 9/11 attacks. It recognises that terrorism needs to be neutralised at its source and in our own backyard."[1]

This issue of POINTER presents a varied range of topics, from an examination of the merits of air power, to a discussion on deterrence as a relevant strategy. Other topics include a look at fifth generation warfare and a general discourse on the concept of outsourcing in the military. We are also pleased to feature two essays, one which deliberates how military leaders can utilise science fiction as an inspiration for their nation's defence, and the other, which studies the impact of unmanned systems on future warfare.

In 'Beyond the Fourth Generation – A Primer on the Possible Dimensions of Fifth Generation Warfare', LTC Victor Chen Kanghao highlights that the world is on the verge of witnessing another generational change of warfare. According to LTC Chen, by critically analysing the evolution of warfare and trends dominating the geostrategic climate today, one is able to distil the key factors that defined each generation, and identify the key drivers and determinants that will eventually shape the next generation of warfare. He suggests that a form of hybrid warfare will be the hallmark of a Fifth Generation Warfare (5GW) and adds that there is also the possibility of interstate war returning in the 5GW environment, and should a conflict of this nature break out, it will almost certainly be a proxy war rather than a conventional war. LTC Chen concludes that by being able to anticipate what shape and form the future warfighting environment will take, national leaders, policy makers and military professionals will be able to adequately prepare themselves to ensure their continued national survival and relevance in the future.

LTC Joe Zhang Ziyong explores the history and evolution of aircrafts in the military context, as well as the strategies behind the victories fought using air power in his essay entitled, 'Expectations of Air Power: From the Birth of Airplanes to Modern Warfare'. In his essay, LTC Zhang stresses that the introduction of aerial vehicles into warfare has made significant shifts in the outcome of both World Wars. According

to LTC Zhang, having an edge in air power over the opposing forces could grant significant advantages even in land battles. He adds that during the post-world war era, political tension between the United States and the Soviets accelerated the need for better and more capable long ranged bombers and, rapid technological advancements made in this era has highlighted the importance of air superiority over the other nations. LTC Zhang also elaborates on the value of intelligence about the opposing forces to maximise the effectiveness of air power. Lastly, he examines the future of air power and how air power can be used for peaceful missions.

The next essay, 'Fact of Science Fiction – Envisioning the Next Technological Disruption in the Present Tense' is written by ME6 Calvin Seah Ser Thong and MAJ Jonathan Quek Choon Keat. According to ME6 Seah and MAJ Quek, advancements in technology have to be a priority for a nation's defence. Both ME6 Seah and MAJ Quek highlight that to ensure that a nation is capable of defending itself against an opposing threat that may be more technologically advanced, defence planning and capability development are crucial. In the unforeseeable future, battles may be fought as seen in science fiction films such as Star Wars. In this essay, ME6 Seah and MAJ Quek discuss how military leaders can utilise science fiction as an inspiration for their nation's defence, whether it is possible for it to come into fruition, and why it should be an attribute that can be considered for military usage. To explain why science fiction could serve as an inspiration, they elaborate on the examples and applications of technology inspired from science fiction examples, in the military. They also highlight how the SAF can use Science Fiction prototyping as a potential feature of its future development.

MAJ Jamie Lee Wenjie's essay is entitled, 'Deterrence: An Archaic Concept or A Relevant Strategy'. In his essay, MAJ Lee analyses the relevance of conventional deterrence theory in an increasingly multi-polar world, fraught with new military and security challenges. Due to various powers jostling for spheres of influence to serve their own interests, within the global arena, he acknowledges that the applicability and effectiveness of conventional deterrence theory in preventing war may be uncertain. However, he feels that with the application of certain practices like having a clear policy direction and strengthening confidence building measures, there can be positive results for deterrence. While the strategies outlined are by no means a one size fit all solution that would immediately render deterrence relevant and effective against all conflicts, MAJ Lee feels that it is still highly relevant in today's context. In the constantly evolving security and geopolitical landscape, it is necessary for deterrence strategies to constantly keep up with the times as well. What countries would need to do is to revisit the fundamentals of deterrence that have served the world well for the past centuries and relearn the basics of applying deterrence theory in the modern world. MAJ Lee concludes that deterrence is still a relevant strategy and it is not yet time to pass it off as an archaic museum relic.

The essay, 'Man of the Machine,' is written by LTA (NS) Chin Hui Han, Ms Annalyn Ng and Ms Sonya Chan. In this essay, the authors discuss how technology has advanced significantly over the years, affecting the way wars are fought and threats dealt with. According to the authors, with the utilisation of technology in the modern military, soldiers may no

longer have to risk their own lives out in the field, but to see action through the 'eyes' of a machine. However, they caution that while unmanned systems may be considered an important element for future warfare, this technology cannot be the panacea. To them, warfare is fundamentally a human endeavour, and therein lies the paradox: unmanned systems need men. While effective collaboration between the two parties would lower the involvement and loss of men in waging war, misuse could bring about more conflicts and war. This essay explores the seeming contradiction in three parts: unmanned systems as a pivotal capability in modern warfare, the pitfalls of taking the man out of unmanned systems, and how the Fourth Generation SAF can avoid these pitfalls to harness the power of unmanned systems. The authors conclude that while Singapore has adopted unmanned systems as a complement to the capabilities for her soldiers, it will be necessary to ensure that the introduction of unmanned systems is followed by comprehensive rules governing their usage, as well as adequate training to ensure that soldiers achieve true integration with their unmanned counterparts.

In the final essay, 'Organisational Design – The Military Perspective' LTC(NS) Halmie Bin Hussein Mattar, examines design structures within commercial organisations as well as military organisations. The concept of keeping lean allows commercial organisations to be effective and efficient in delivering their business strategy and plans. The military however, according to LTC(NS) Mattar is characterised by a monopolistic industry, that is not affected by profit or losses. As the evolving political, economic and social environment is pushing the military to adopt lean concepts, it faces adverse questions on its efficiency and effectiveness. LTC(NS) Mattar highlights that as the military adopts organisational design models of keeping lean, through delayering its structures and outsourcing its functions, it needs to appreciate the roots of its traditional design and the implication of adopting any new concept. The principle of keeping lean with delayering and outsourcing of activities is not totally ineffective in the military organisation. LTC(NS) Mattar believes that the concept has its merits and military can exploit the concept while comprehending its limits and appreciating its roots. However, he cautions that while it is efficient to delayer its structures and outsource some of its activities, for example training, the military must be certain that its core competencies of developing its leaders and imbuing its soldiers with its values and norms are not eroded. LTC(NS) Mattar cautions that while the military continues to outsource its military tasks, it must constantly anchor on its core competencies. It must never outsource its core competencies or any tasks linked to its core competencies. There should not be a situation when the military is called into action and it is not able to deliver mission success.

POINTER would like to take this opportunity to bid farewell to COL Edwin Goh Tiong Cheng, a key member of the POINTER Editorial Board. We wish to thank COL Goh for his full support of POINTER. Thank you very much, COL Goh! We would also like to extend a warm welcome to Mr Eugene Chew as he joins the POINTER Editorial Board.

The POINTER Editorial Team

ENDNOTES

1 https://www.mindef.gov.sg/web/portal/mindef/news-and-events/latest-releases/article-detail/2018/july/27jul18_nr

BEYOND THE FOURTH GENERATION – A PRIMER ON THE POSSIBLE DIMENSIONS OF FIFTH GENERATION WARFARE

by **LTC Victor Chen Kanghao**

Abstract:

In this essay, the author highlights that the world is now on the verge of witnessing yet another generational change of warfare. According to him, by critically analysing the evolution of warfare and trends dominating the geostrategic climate today, one is able to distil the key factors that defined each generation, and identify the key drivers and determinants that will eventually shape the next generation of warfare. The author also suggests that a form of hybrid warfare will be the hallmark of a Fifth Generation Warfare (5GW). He further adds that there is also the possibility of interstate war returning in the 5GW environment, and should a conflict of this nature break out, it will almost certainly be a proxy war rather than a conventional war. The author concludes that by being able to anticipate what shape and form the future warfighting environment will take, national leaders, policy makers and military professionals will be able to adequately prepare themselves to ensure their continued national survival and relevance in the future.

Keywords: Contemporary Conditions; Implications; Generational Shift; Shape and Form; Proxy

INTRODUCTION

The perpetually shifting sands of geopolitics, coupled with the evolution of military technology and warfighting concepts over the centuries, have set the stage for how states resolve conflict and prosecute wars. The strategic geopolitical environment over the years were characterised by the rise and fall of imperialism and colonialism in the 19th and early 20th centuries, the struggle to secure resources in a newly industrialised world in the 20th century, the consolidation of global balance of power into a bipolar world and, the subsequent emergence of a global hegemon in the late 20th century. This has been overlaid with rapid globalisation, revolution in information technology and movements of ethnic, ideological or religious struggles over the years. In their seminal article, Lind et. al. in 1989 put forth a study on the progression of warfare through three distinct generations, and made a prediction of the next generation of warfare.[1] Fast forward to today, beyond the 4th generation, academics and theorists remain divided on what constitutes future warfare in the 5th generation, with no commonly agreed upon perspective. Granted, it is an impossible endeavour to precisely and accurately predict the future, but the process of analysing and thinking about the future will allow the formulation of a range of options at the strategic and operational levels, in terms of doctrine development, force planning and force structuring. Essentially, planners will be able to be armed with a solid research basis for the formulation

of warfighting concepts and strategies that would be applicable across a spectrum of contingencies, and yet practicable within the confines of the resource limitations of finance, manpower, time and space.

This essay will first provide an appreciation of the preceding four generations of warfare and discuss contemporary conditions that now set the stage for the future war beyond the 4th generation. Then, a primer on the possible dimensions of the 5th generation, along with its implications to modern militaries today will be provided. It is important to emphasise that this essay is neither able to make predictions of the reasons behind which future wars will be fought, nor will it be able to specifically identify the potential belligerents involved. That, after all, will be a futile effort in gazing into the 'crystal-ball'. Rather, the focus will be on deriving the generational shift and the most probable shape and form that future warfare will undertake.

GENERATIONS OF WARFARE – FROM 1ST TO 4TH

1st Generation Warfare (1GW) was characterised by simple line-and-column tactics and smoothbore musket, where battles fought were rigid and orderly. Many vestiges of the 1GW era still survive to present day, such as chain of command, uniforms distinguishing civilian from military, military discipline and marching drills. Moving on to 2nd Generation Warfare (2GW), best demonstrated during World War I (WWI), changes were driven by technology in the form of the rifled musket, machine guns and indirect artillery fire.[3] Tactics in 2GW involved trench warfare, together with fire and movement, with the goal of attempting to achieve attrition of enemy forces. In the modern era, 3rd Generation Warfare (3GW) emerged with the growing prominence of the use of armoured vehicles. In 3GW, the emphasis was on movement, speed, the element of surprise and dislocating the enemy from behind.[4] The German idea of *blitzkrieg* in WWII formed the essence of manoeuvre warfare doctrines.[5] Instead of massing firepower to clash head on with the enemy on a linear frontline, manoeuvre tactics included flanking, cutting the enemy off from behind, and destroying the enemy by encircling from multiple sides.[6]

Figure 1: An image showing the characteristic of what is commonly known as blitzkrieg.[2]

It is thereby evident that the two major determinants that brought about the transformation that defined one generation from the next were namely paradigm shifts in technology and ideas. The shift from the 1st generation to the 2nd was attributed to the invention of the machine gun and artillery, while the shift from the 2nd to the 3rd generation was the introduction of the tank and the idea of manoeuvre warfare.

In the 4th generation, concepts of war and politics, civil military relations, conflict and peace as well as areas of contention and purported safe areas, have been merged. The exclusivity of the nation-state having a monopoly on waging war has diminished. This signified a departure from the Westphalian notion of state warfare and perhaps even a regression back to the pre-Westphalian era. Non-state actors, sometimes sponsored by rogue nation-states or shadowy

organisations, now have a means to use violence to further their political agendas. This has been made possible with globalisation, and information technologies that enable global communication, garnering support from across national boundaries and legitimising the actions of these non-state actors.[7] With no clearly defined battlegrounds, 4th Generation Warfare (4GW) was conducted simultaneously in the physical and ideological domains, spanning the city centres, rural provinces and in the internet, battling for the mind space and support of the population. Leaders in 4GW have the responsibility of selecting targets that are both combatants and non-combatants, centres of legal, economic and political power, as well as religious and ideological institutions. As Thomas Hammes suggested, in 4GW, the ultimate objective is to undermine the adversary's weaknesses in a precise manner and not allow the expression of its strengths, thereby convincing "the enemy's political decision makers that their strategic goals are either unachievable or too costly for the perceived benefit."[8]

THE STRATEGIC ENVIRONMENT OF FUTURE WAR

The following section examines the geostrategic factors driving the change of the strategic environment thereby setting the stage and laying the conditions for the new form of generational warfare to emerge.

a. Globalisation is a key trend that will impact the next generation of warfare. Unbridled mass communications via social media, global connectivity and technological advancements, coupled with increasing industrialisation and prosperity accentuating income gaps would inevitably provide the perfect breeding ground for spreading dissent and burgeoning tensions.[9]

b. The rise of radicalism is another feature of the future operating environment. Increasing numbers of supporters for extremist radical Islamic groups such as the so called Islamic State pose a significant cause for concern. The often visceral response from non-Muslim communities leading to 'racism, religious bigotry and Islamophobia' exacerbates the situation, further polarising and destabilising the world.[10] Conflicts involving religious radicals will be complex, difficult to resolve and protracted in duration.

c. Global demographic trends such as rapid population growth and growing income gaps will add to the growing instability, especially in developing countries. By 2025, owing to rapid urbanisation, close to one-third of the world's population will be living in built-up areas.[11] Terrorist groups and extremists will be able to seek subterfuge amongst the urban population dwellings, making it difficult to conduct counter-terror operations in such areas.

d. With natural resources such as food, water, energy and commodities in limited supply, and as populations grow exponentially and developing economies seek first world status, the demand for resources is set to increase accordingly. Priorities of states in the future would shift to become a mad scramble to obtain these limited resources. This has a destabilatory effect on regional and global politics. The potential for states with their survival at stake to secure access to these resources via the use of armed force will likely increase, leading to possible conflict.

e. The proliferation of Weapons of Mass Destruction (WMD) is another area of concern that would increase the possibility for

devastating consequences in the future strategic environment. With North Korea withdrawing from the Nuclear Non Proliferation Treaty (NPT) and countries such as Iran, Syria and Libya allegedly developing nuclear weapons in secret, the potential for new nuclear capable nations emerging is real.[12] The possession of WMDs, ranging from chemical, biological, radiological or nuclear devices with the potential for causing widespread destruction to people, property or infrastructure, will be within the reach of weak, failing states with unstable regimes. The possible usage of nuclear weapons or WMDs in future conflicts will become increasingly more likely.

f. The advent of science and technology would bring about much change that would undoubtedly alter the future strategic operating environment. The drivers of future transformatory change could be from any one of the following areas: artificial intelligence, genomics, alternative fuels, nanotechnology, robotics, trans-humanism, augmented reality and quantum computing.[13]

As a result of these technological advancements, one can expect very significant economic, social and political transformations to come. Military applications of these technologies could soon follow, adding to the uncertainty of the future battlefield.

g. The end of the Cold War saw the shift from a bipolar world to a unipolar one, with the United States (US) performing the role as the global hegemon. Some international relations theorists and academics such as Colin Gray predict that with the rise of major powers such as China and Russia, inter-state war may very well experience a resurgence. He theorises that in the near-future, geopolitical rivalries between major powers fuelled by crisis of the environment would pose the greatest likelihood for conflicts.[14]

Figure 2: Different symbols of Weapon of Mass Destruction.[15]

INTO THE 5 TH GENERATION – HYBRID WAR AS A POSSIBLE DIMENSION

As the generations of warfare transit from one to the next, there will be certain elements that will persist and carry forward into the next era. In the transition between 1st Generation Warfare (1GW) to 2GW, the culture of obedience, order and discipline remain. From 2GW to 3GW, although the focus shifted to manoeuvre, the concept of indirect fire support is still maintained. In 4GW, the notion of flexibility and initiative was a theme borrowed from 3GW. Likewise, in 5GW, some elements of 4GW will be retained. Nathan Freier seemed to think that the 'irregular' and asymmetric nature of conflict will remain a feature of future wars, especially as a threat against the US. However, he also opined that potential future adversaries will likely also employ strategies that are 'traditional, catastrophic and disruptive' at the same time.[16] Thus, aligned with the thinking of Freier, it would not be unreasonable to suggest that the element of asymmetric fighting could perhaps be the feature that would be carried forward from 4GW into 5GW.

The blurred lines between warfare modalities and elements are further exacerbated by rapid technological change. State, state-sponsored and non-state actors now have a wider range of options in terms of tactics and technologies and would be able to creatively exploit these to their advantage in ways previously not thought possible, to further their respective interests and objectives. Technologies that are traditional to conventional warfare such as command, control and communications information systems and modern high-tech weaponry such as anti-satellite jamming systems can be used in concert with improvised explosive devices and man portable anti-aircraft rockets to devastating effect.[17] This mix of conventional and insurgent capabilities will result in an added dimension of complexity in future conflicts.

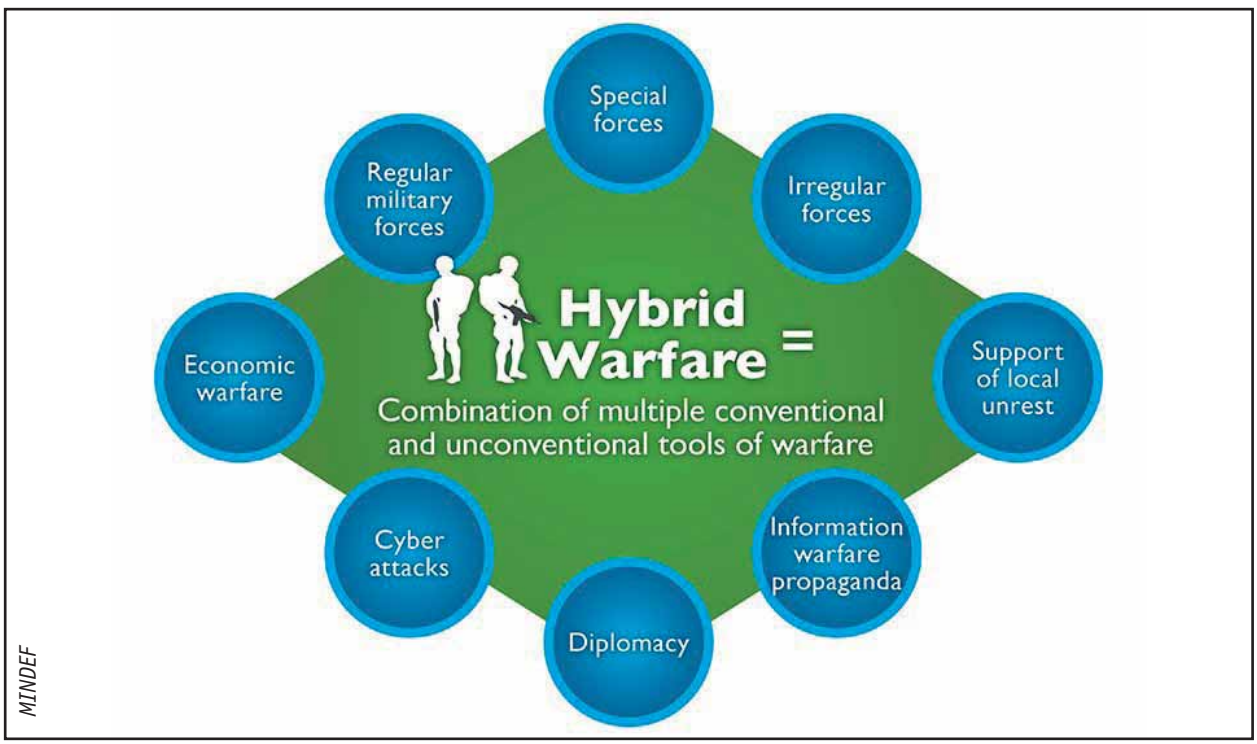

Figure 3: Hybrid Warfare.[18]

The blending of warfare capabilities would bring about a combined form of conflict known as hybrid warfare.[19] Hoffman described the convergence of the physical and psychological, state and non-state actor, combatant and non-combatant, as well as kinetic and informational approach as a feature of hybrid warfare.[20] Another proponent, William Nemeth also put forth the case that hybrid warfare would add further complexity to the future warfighting environment in that hybrid forces would be able to creatively assimilate technology into their force structure and doctrine, and utilise the technologies beyond the 'intended employment parameters.'[21] The effectiveness with which these non-state actors utilise the increasing prominence of soft power to influence and prosecute their respective agendas would bring about the hybridised nature of future conflict to centre-stage. For example, we have seen how Al-Qaeda and other religious extremist groups make use of computers, social media and the internet to spread their propaganda and bolster their ranks through recruitment and indoctrination.[22] In a similar vein, other non-state actors and terrorist organisations will be able to exert their influence in non-traditional spheres. Thus, within their limited operational spectrum, hybrid forces will be able to deftly exercise the element of fundamental surprise to overcome more advanced adversaries, making them harder to predict and mitigate against.

The drivers of future transformatory change could be from any one of the following areas: artificial intelligence, genomics, alternative fuels, nanotechnology, robotics, trans-humanism, augmented reality and quantum computing.

It is however important to note that the rise of hybrid wars does not connote the demise of conventional warfare. It merely suggests that conflicts of the future would feature a mix of different warfare elements, conducted simultaneously and coherently towards the adversary. The lines between regular and irregular combatants, conventional and asymmetric warfare are becoming increasingly blurred.[23] A detailed study of prevailing literature revealed that there is insufficient clarity of the definition of hybrid warfare. In fact, most definitions, such as the ones put forth by Hoffman and Nemeth, focus mainly on irregular forces adopting the tactics of conventional forces. The aspect of conventional forces adopting unconventional tactics is neglected. Thus, perhaps a more encompassing definition of hybrid warfare, to better illustrate its conduct is proposed as follows: 'A form of warfare which could involve asymmetric forces utilising the strategy, tactics and methods typical of conventional armed forces; and conversely, conventional armed forces utilising asymmetric strategy, tactics and methods.' In essence, during future conflicts, state actors would no longer be averse to utilising unconventional strategies. Similarly, non-state actors would be seen to be able to acquire weapon systems that previously were in the realm of state military capabilities. Hybrid warfare would thus incorporate many additional layers of complexity that would make the future security environment particularly challenging, and will qualify as a possible 5GW dimension.

THE RETURN BACK TO INTERSTATE WAR AS A FEATURE OF 5GW

Since the end of the Cold War, the US has enjoyed the dominant, unchallenged position as the world's sole superpower. This unipolar position has been unrivalled for the past few decades. The extent of this has been so great that some researchers have even

A whole-of-government approach, comprising sound internal policies, tight financial controls, shrewd diplomacy and maintaining a capable military force will set firm foundations for a state to be able to effectively tackle 5GW threats in future

taken it for granted that interstate war is becoming a 'historical curiosity.'[24] However, this view may not necessarily hold true into the 5th generation. With deep analysis of the various geo-strategic factors that would shape the future environment, one would conclude that there is a distinct possibility that interstate war may return. One such academic who holds the same view is George Friedman. He argued that in 4GW, the focus had shifted to asymmetric threats, but beyond the 4th generation, a future return back to threats from the nation-state would be heralded.[25] As history has shown, global power shifts wax and wane along the ebb and flow of time. Former great empires such as the Roman Empire and Great Britain have seen their power reach its peak and thereafter eventually erode. It would be naive to think that in a similar vein, US hegemony would maintain its unchallenged status for eternity. The perceived permanence of the US' global hegemony could very well be a transient illusion, should world developments continue in its current trajectory.

Eventually, great power rival-states, as they continue to build up their economic and military power, will reach a stage whereby they would be able to challenge the existing world order. Emerging global powers, in their frenzy to secure resources to fuel their growth in future, may possibly be emboldened to adopt combination hybrid strategies to engage the US through proxies or even adopt asymmetric tactics. The form that interstate war would return, could not only be in the form of asymmetric war, but as tensions escalate and conflicts mount, could even signal the resurgence of conventional warfare. A combination of asymmetric and conventional tactics would hence lend further credence to the argument that hybrid wars will dominate the 5GW.

THE DIMENSION OF PROXY WARS TO PROSECUTE INTERSTATE WARS

The concept of the proxy war, introduced by Karl Deutsch in 1964, is not a recent one.[26] History is laden with instances of proxy wars, with prominent contemporary examples during the Cold War era. However, moving forward into the future, while the concept of proxy war would largely remain, the character of proxy war would be destined to change.

While we have established the plausibility of the resurgence of interstate war fought in a hybrid manner as a potential feature of 5GW, such an endeavour would likely be highly costly. The costs not only refer to financial or economic costs, but costs that would also have significant political repercussions as well.[27] Governments will have to be held accountable to the public on the impact of such a war. Prosecuting interstate wars may even contravene constitutional or legal parameters, and the belligerents would likely face immense international pressure or sanctions until the cessation of hostilities. These costs and repercussions would be even more apparent if the belligerents involved a great power rival-state against a global hegemon. The likelihood of nuclear weapons and WMDs used in such an instance would be very real, given the high stakes that would be involved. This is a scenario that may even take on a global scale when allied nations of either party are inevitably drawn into the conflict when they

are forced to take sides. Thus, a less risky course of action would be to perpetuate the global power shift through prosecuting a proxy war, thereby challenging the world order without having to be involved in an interstate 'Total War'. Furthermore, there is an added advantage with the element of plausible deniability, where any connection to the belligerent states could be calibrated to be as apparent or as tenuous as the sponsoring state desires. It is hence very likely that in the 5th generation, proxy wars will continue to be a feature, especially in conflicts involving great power rival-states.

A form of warfare which could involve asymmetric forces utilising the strategy, tactics and methods typical of conventional armed forces; and conversely, conventional armed forces utilising asymmetric strategy, tactics and methods.

IMPLICATIONS OF THE FUTURE 5TH GENERATION WAR

To effectively prepare to meet the challenges that 5GW will bring, defence planning will have to be done using multiple approaches. Looking at the current development status of the US military, national strategies, warfighting concepts and force structures are inadequate to meet the converged nature of 5GW, both at the structural and intellectual levels to meet the emerging threats.[28] Unsurprisingly, most other militaries around the world also face this same problem. Thus, the way we begin to view our national policies, security architecture and defence planning will need to change, in order to be relevant in the 5GW era.

A whole-of-government approach, comprising sound internal policies, tight financial controls, shrewd diplomacy and maintaining a capable military force will set firm foundations for a state to be able to effectively tackle 5GW threats in future. Military force should only be used as a last resort when all other soft power approaches such as diplomacy and dialogue fail. With the world becoming increasingly complex and unstable, special effort needs to be taken to build relations internationally, foster dialogue through regional forums, and engage in international economic co-operation. Direct military responses alone to security and defence threats will no longer be adequate. Rather, military action must be part with of a larger, well-considered, holistic plan aimed to tackle the root of the problem rather than to simply address the symptoms.

The more integrated economies are, the more co-operation and dialogue can be used as a means of settling disputes. Consequently, the less likely disputes will turn into armed conflict. Fostering an inclusive, tolerant and respectful climate is key to promoting deradicalisation. Ensuring a strong rule of law with appropriate powers of arrest safeguards such as the equivalent of Internal Security Acts or Prevention of Terrorism Acts coupled with accurate and timely intelligence will aid in keeping terror in check. The risk of a catastrophic attack in a hybrid war using WMDs can be mitigated via increased emphasis on worldwide conventions and treaties concerning the prevention of use, as well as a concerted global effort in reducing stockpiles of fissile materials and nuclear forces.

However, sometimes war and armed conflict are unavoidable when a state is attacked. First and foremost, proper safeguards need to be in place to guard against disruptive attacks in the event of a

hybrid war. These safeguards include investment in developing a capable cyber security force or dedicated cyber warfare command to protect against attacks on critical infrastructure systems and economic institutions. Appropriate redundancies will need to be built into the system architecture to ensure robustness and operational continuity. Militarily, armed forces will have to evolve its warfighting concepts to address both state and non-state actor threats in a hybrid war. This will involve the development of a well-rounded, flexibly deployable armed force capable of addressing the full spectrum of threats in the complex geostrategic environment.

With the conflicts in the past decade or so characterised by wars fought against irregular or asymmetric forces, many states have given much priority in its budget to develop counter-measures against such adversaries. In the advent of 5GW, states will need to shift its emphasis back to developing its conventional warfare capabilities, repositioning its force structure to ensure that beyond the traditional land, air and sea capabilities, the new domains of outer space and cyber space are addressed as well. It is critical to develop the full range of capabilities, from flexibly deployable special forces units, to self-sustainable expeditionary forces—carrier-based aircraft and Marine troops capable of conducting operations across the globe at a moment's notice. This will hence address the full spectrum ranging from asymmetric to conventional warfare threats. The military of the future will certainly need to be a 'balanced and versatile force,' and not a single-mission force, in order to meet the hybridised threats in the new 5GW environment.[29]

In terms of human capital, 5GW soldiers and leaders need to be trained such that they are culturally-sensitive, internationally-attuned and possess the requisite skills to face the challenges in the uncertain and complex operating environment of tomorrow. Krulax's Three Block War concept, where soldiers are expected to conduct full scale military action, peacekeeping and humanitarian aid within the space of three city blocks, may no longer be sufficient. Rather, in 5GW, soldiers now need to operate in an additional 'Fourth Block.'[30]

This is namely in the information or psychological operations domain, where future soldiers need to be able to compete with the adversary in defending their respective ideologies, even whilst not being physically located in theatre.[31] One enabler of this block is the advent of social media in the constant battle for mindspace of the public. This will require a rebranding of sorts; the soldier of the future is no mindless grunt, but a highly-educated, versatile, culturally-sensitive and technologically-savvy warrior. To develop such soldiers is no easy feat. Militaries of the future will therefore need to make paradigm shifts in their recruitment, retention and training efforts in order to effectively raise, train, sustain and deploy this highly adept 5GW warrior force.

CONCLUSION

This essay has put forth the thesis that the world is now at the cusp of witnessing yet another generational change of warfare. By critically analysing the evolution of warfare and trends dominating the geostrategic climate today, one is able to distil the key factors that defined each generation, and identify the key drivers and determinants that will eventually shape the next generation of warfare. It was suggested that a form of hybrid warfare could be the hallmark of 5GW. There is also the possibility of interstate war returning in the 5GW environment, and should a conflict of this nature break out, it will be almost a certainty that it would be a proxy war rather than a

conventional war. The additional layers of complexity presents the paradigm shift that ultimately propels the generational shift from 4GW to 5GW. Overall, this offers a significant shift in paradigm in terms of how one prepares for and wages war. Therefore, by being able to anticipate what shape and form the future warfighting environment will take, national leaders, policy makers and military professionals will be able to adequately prepare themselves to ensure continued national survival and relevance in the future.

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EXPECTATIONS OF AIR POWER: FROM THE BIRTH OF AIRPLANES TO MODERN WARFARE

by **LTC Joe Zhang Ziyong**

Abstract:

The introduction of aerial vehicles into warfare has made significant shifts in the outcome of both World Wars. Having an edge in air power over the opposing force could grant significant advantages even in land battles. From turbine-powered planes to jet-powered aircrafts, this essay discusses the history and evolution of aircrafts in the military context, as well as the strategies behind the victories fought, using air power. During the post-world war era, political tension between the United States and the Soviets accelerated the need for better and more capable long ranged bombers and, rapid technological advancements made in this era has highlighted the importance of air superiority over the other nations. This essay also elaborates on the value of intelligence about the opposing forces to maximise the effectiveness of air power. Lastly, the author examines the future of air power and how air power can be used for peaceful missions.

Keywords: Air Power; Joint Operations; Technological Race; Co-ordinated Firepower; Intelligence

INTRODUCTION

Deciphering The Expectations of Air Power

The high expectations of air power began even before powered flights became a reality. Major J.D. Fullerton envisaged a 'revolution in the art of war' and the probable conclusion of war once an aerial fleet arrived over the enemy's capital. He made that statement ten years before the Wright Brothers' maiden flight.[1] Daniel Moran cited two examples in which both H.G. Wells and Giulio Douhet had, in the early 20th century, expected wars to be swiftly concluded via the devastating effect of aerial bombardment. The real capabilities of air forces would have indeed fallen short when the exaggerated theoretical expectations are directly compared against the actual duration of both world wars. Convincingly, this expectation gap can be attributed to two issues. One was due to immature technologies, and the other, due to institutional demands for independent air services that are co-equal with armies and navies.[2]

With the two issues largely resolved within the 20th century, Moran further substantiated the limited roles of air power. Air power was the all-purpose glue that makes modern combined arms possible and air power as an independent strategic role would only be useful in two extreme situations. One would be in nuclear war and the other would be in conflicts requiring limited force. The latter would involve air power as a tool of coercion by strong countries. Aerial precision weapons have been the hallmark of such coercion on isolated and despotic regimes, especially after the cold war. One can also agree with Moran that whilst precision bombing alone could disable enemy governments and their armed forces, swift and convincing victories are still dependent by how each side understood and perceived the other. However,

a contrarian view would be taken against Moran's stance that liberal democracies in the modern era would limit the utilisation of air power to general war.[3] In the extreme circumstances of strong state-society unities on both sides, a total war leveraging on air power may remain the only option for survival. The turn of events leading to the two world wars should never be forgotten.[4]

Scope

Why did the real capabilities of air force often fall short of expectations throughout the history of air warfare? How did air power advocates eventually converge on the true prowess of joint operations? Where would air power stand in the future? Through discussions on key air power advocates, aviation technologies and doctrinal employments of air power throughout three periods of aviation history, this essay will expound on Moran's stance. These periods were chosen based on significant changes in the conduct of air warfare and what were keenly expected of air power. These changes were usually conceptually or technologically driven.[5]

The first period would begin from the birth of air power to the end of World War II (WWII). The second period continues from the end of WWII to the withdrawal of the United States' (US) forces from Vietnam. The third period would then end with the coalition forces' drawdown in Afghanistan. Lastly, with the revival of the 'Soviet Might' and the rising challenges from the Super Power, China, the future of the dominant Western air power may now be challenged.[6] The future of air power will be discussed with this uncertainty in consideration. To scope the discussions further, the realms of space and cyber space will not be covered although Western air power doctrines have increasingly included military concepts related to these extra spaces.[7] Additionally, tactical to operational air power strategies will not be the main focus of discussion in this essay.

THE BIRTH OF AIR POWER, THE TRIALS IN WWI AND THE REVELATION IN WWII

Birth of Air Power

Air power was truly born when the Italian powered airplanes flew reconnaissance and 'light bombing' missions (using hand grenades) over Libya against the Ottoman Empire took place in 1911. This occurred in the background while European powers were still debating on the possible military employment of airplanes in war.[8] Whilst the Germans, French and British military commanders feared that air war would lead to the dissolution of armies and navies, the Italians were attempting to make headway in strategic bombardment through Giulio Douhet's drive for multi-engine bombers.[9] In the lead up to WWI in 1914, the European powers had not placed sufficient resources and emphasis to expand the potential of airplanes beyond the roles of an artillery spotter and 'light bomber'. This was despite the high expectations that the press and public had on the future of air power.[10]

Air Power Trials in WWI

In the beginning of WWI, air power began to make a difference to land warfare. Enemy ground troops had to conceal their activity more extensively whilst friendlies could be informed of a possible flank for manoeuvre. The French, British and Italians started to build airplanes that were capable of flying long distances to carry out bombing on the cities of their foes. The Germans continued to improve on their Zeppelin airships for the same purpose, hoping to diminish any British determination in fighting.[11] As they trialled with the bombing raids through days and nights during the course of the war, an aerial warfare was gradually taking shape. Lighter and faster moving

airplanes armed with machine guns were made for the pursuit of enemy bombers in the air. Air-to-Air fighting tactics were born. Escorting bombers and reconnaissance aircraft became missions for these fighter aircrafts. Strafing airplanes soon became the land forces dread or essentials for tactical victory when anti-aircraft measures were still primitive.[12] Although the introduction of radio communications, machine guns and tanks also made significant differences in WWI, air power had played a significant role in the allies' temporary triumph over the credible German forces. In fact, just before WWI ended, the British formed an air ministry and the Royal Air Force so as to develop a decisive strategic bombing capability against the Germans.[13]

Revelations in WWII

WWI opened the Pandora's Box of air power. During the interwar period leading up to WWII, staunch air power advocates rode on the wave of aerial platform developments. Giulio Douhet returned from isolation by his superiors in the army who had resisted his rhetoric for air power to dominate Italy's military efforts in WWI.[14] He served as director of aviation and wrote on the *Command of the Air*, which continued to push for an independent air arm capable of achieving the modern equivalent of air superiority.[15] Regia Aeronautica, the Royal Italian Air Force, was finally formed in 1923. As air power theorists such as William Mitchell, Hugh Trenchard and A.N. Lapchinsky echoed the value of strategic bombing, independent air forces capable of conducting long-range strikes began to form across Europe and America.[16] To meet their expectations of a swift and decisive victory through the total loss of enemies' will-to-fight, technologies and doctrines were centred on strategic bombardment.[17]

However, just a few years before WWII began, the axis of evil, Germany-Italy-Japan adopted a different concept. They started to focus on fighter aircraft developments due to issues such as high manufacturing costs of bombers and lack of technological breakthrough in the bomber's engine. The nonlinearity of war was immediately apparent as WWII broke out in 1939.[18] In Europe, instead of the expected strategic bombing missions over London, the Germans conquered grounds with Luftwaffe fighters providing air superiority over all the Panzer manoeuvres.[19] By 1940, the Germans were able to inflict substantial casualties and damage close to the heart of London. But, they failed to wreck the morale of the British without sustained and massive aerial bombing capabilities. Britain and France were compelled to emphasise fighter airplane development in order to deny German's air superiority that provided a force multiplying effect for their surface battles. The advent of Spitfires and Mosquitoes afforded the allies with air superiority over Normandy and eventually paved the way for their strategic bombers to meet the long awaited expectation—the annihilation of Dresden and Berlin through waves of massive bombings. The Germans would lose their will to fight and surrender in 1945.

Air power was the all-purpose glue that makes modern combined arms possible and air power as an independent strategic role would only be useful in two extreme situations. One would be in nuclear war and the other would be in conflicts requiring limited force.

In the Pacific, a war of distance was fought between the American and Japanese naval aviation arms. Although both countries were approximately matched in air power, it was the indirect approach of an island hopping campaign that awarded the

Americans with the final nuclear blow on Japan. The capturing of islands for the forward deployment of US bombers must be credited to the US Navy and Marines.[20] In retrospect, the allied soldiers in the Normandy Beach landing must credit their tactical victories to the allied air forces.

There was a revelation beyond the complex relationships among technologies, leadership and fighting doctrines in the aviation world. The level of integration between independent air, land and naval forces was a key factor to the successful outcome of a campaign. Each must not interfere with what the other does best, but each must work closely to achieve a single desired outcome. An independent air force must not be interfered with its quest for Air Superiority, yet it must provide forces and sufficient reserves to influence surface battles for her sister forces.[21]

ACCELERATING AIR POWER DEVELOPMENTS IN A CHANGING POLITICAL ENVIRONMENT

From post WWII to the end of the Vietnam War, two significant political environments accelerated the development of air power. The polarisation between the Democratic Western and Communist Eastern blocs propelled the growth of aircraft and spacecraft technologies, aerial weapons, ballistic missiles and ground-based air defence systems. In the other environment, the struggle for a Jewish foothold in the Middle East helped proved the effectiveness of well-designed air power doctrines and well-trained air warriors.

Accelerated Advancement in Air Power Technology

In the late 1940s, the Western blocs knew that it would have to be a War of Alliance against the growing Soviet threats. The formation of the North Atlantic Treaty Organisation (NATO) in 1949 would pool the air power resources against a burgeoning Soviet Air Force with long-range bombers that were capable of launching nuclear weapons. But, the real wars would not be fought with nuclear weapons, at least in President Truman's reign.[22] In the early 1950s, the Korean War was a fight against communism and it had to be fought indirectly through South Korean and United Nation proxies. US Air Force doctrines had focused on bringing the air war over Soviet grounds and this drove the development of jet aircrafts, long-range heavy bombers and airlifters that were designed to fly fast and far. Unexpectedly, the Western and Eastern bloc confrontation was over the Korean Peninsula and the proxies must not be annihilated. Indiscriminate bombing could not take place and the allied ground forces had to face a formidable ground threat from the communist forces. Although the United Nations Command (UNC) had relatively superior air power, they were unprepared and did not adapt to the revelation from WWII. In fact, while the air arm completed its job of destroying the North Korean Air Force aircraft on the ground, allied commanders failed to harness the full force of integrated firepower from the three services to win land battles.[23]

Perhaps, one of the mitigating reasons could be the effectiveness of Soviet sponsored air defence systems. The Soviets had provided effective radars and air defence guns to the North Koreans. Allied Close Air Support (CAS) missions were dangerous and many allied airplanes were downed during the war. Or perhaps aircraft such as the F-80 interceptors that were designed for air-air fights against the MIGs had proved unsuitable for CAS missions. Or perhaps it was the inaccuracy of bombers in the series of ineffective interdiction missions. Regardless, air power again did not afford the allies with a swift and decisive victory. Certainly, one can attribute that to the under developed doctrines and training for integrated firepower. Allied weapons systems for

CAS and interdiction missions were also not well developed. But most importantly, there was no clear political objective from President Harry Truman and allied leaders, and that must be the true cause of air power's inefficiency in the Korean War.

Although aviation technologies continue to advance during the years leading up to the Vietnam War, the US and her new allies continued to make similar mistakes from the Korean War. High altitude spy planes, CAS aircraft, attack helicopters and gunships failed to defeat the Vietcong even though air superiority was achieved right from the initial stage. Indeed, air power provided the allies with tactical victories but the nonlinearity of war compelled the withdrawal of allied forces. The war of attrition had forced the Americans and the US government to cede. Again, there was no clear political objective from the allied leaders.

The technological race in nuclear ballistic missiles between the Eastern and Western Blocs also occupied the aviation stage from the 1950s to 1970s. The expectations of air power then evolved to include the ability to deter via Mutual Assured Destruction (MAD). Since annihilation could be achieved without mounting large-scale air campaigns, it was essential that such threats be neutralised far away from home. As such, nuclear capable strategic bombers and air-based Intercontinental Ballistic Missile (ICBM) interceptors were in vogue. Since deterrence worked and the leaders involved in the Cuban missile crisis did not escalate into World War III (WWIII), air power can be considered as having met the expectations.

Accelerated Advancement in Air Power Employment

If air power never met its expectation, one must have been proven wrong when the Israelis won convincingly in the Six-Day War. The synergy in technology-leaders-doctrines epitomised the capability of air power in the Israeli air campaigns against the Arab belligerents. The Israeli Air Force (IAF) had acquired a modern fleet of French fighters and integrated them with indigenous Electronic Warfare (EW) systems. The Israel Defense Forces (IDF) commanders embraced the concept of an independent air force and the need for integrated operations

Royal Air Force Regiment Forward Air Controllers guiding a Eurofighter Typhoon onto their target

The IAF's Special Electronic Missions Aircraft

amongst the three services. IAF doctrines focused on the attainment of air superiority, support of ground and sea forces and the systematic destruction of strategic targets in enemy territory. The latter aimed to degrade or destroy the enemy's capability and will to continue a war.[24]

Two key sub-factors were the credible Command, Control, Communication and Intelligence (C3I) capabilities built up, as well as the relentless training before the wars broke out from 1967. C3I was essential to the orchestration of complex air operations and joint warfare. Accurate and timely intelligence also allowed the IAF planes to attrite the enemy air assets on the ground. The amount of training and rehearsals that the IAF undertook reduced the impact of uncertainty throughout the air campaigns.[25]

Although many would agree that the IAF failed to meet the expectations from 1969-1970 during the wars of attrition with Egypt, one cannot ignore the fact that the Israelis were fighting a powerful Soviet-Egypt-Syria alliance alone. US support was limited to the provision of aerial platforms and ground defence systems. The IAF should be considered as instrumental to Israel's political objectives as it accentuated the tenets of AirLand battles to deny further advancement of Arab forces beyond Sinai.[26] In the decades that followed, the IAF continued to demonstrate both its offensive and defensive effectiveness during the wars that were fought under the nation's Non Offensive Defence strategy.[27]

THE DOMINANT US AIR POWER AND ERA OF PRECISION AIR WARFARE

Two key events influenced the developments in air warfare in the last quarter of the 20th century. The high losses of American troops in Vietnam served as a grim reminder for nations to avoid committing large ground forces into fights on foreign soils. Air power provided the best hope of coercing a weaker country into submission with minimum friendly losses expected. Coincidentally, the gradual demise of Soviet threats in the late 1980s greatly reduced the nuclear threats to the US and allies. This concoction

The BOLT-117, the world's first laser-guided bomb

facilitated the domination of US air power and particularly in the trials of precision aerial weapons for air warfare.

Proving the Worth of Precision Air Power

The Gulf War was a good test bed for the US and the coalition air forces. The full potential of air power could be evaluated without significant resistance from the relatively inferior Iraqi Armed Forces. Stealth and precision weapon systems designed to achieve a surprise offensive as well as maximum effect with minimum collateral damage, found the best environment to prove their worth. The lessons of joint operations from Korea to Vietnam were finally well incorporated into doctrines and training. Most importantly, there was no credible Soviet involvement in this round.

This expectation of air power was met as the coalition air forces struck the five layers of the Iraqi's Centre of Gravity (CoG) with immense and co-ordinated firepower.[28] Air superiority was achieved quickly with the parallel attacks (strategic bombing through Tomahawk Missiles, Stealth and fighter-bombers) on Iraqi air defence systems, Command and Control (C2) systems, government and military installations. The coalition air forces swiftly turned their massive firepower onto CAS and interdiction missions, seriously dislocating the morale of the Iraqi forces and their will to fight.[29] The tenets of air power were demonstrated repeatedly as the coalition air forces pounded the Iraqi forces out of Kuwait within a short span of two months.[30] Similar successes were repeated in the Bosnia and Kosovo wars although Milosevic 'chickened out' from a possible ground invasion into Serbia.[31]

Intelligence and Precision Air Power

But, one can argue that the massive air power domination failed to defend the Americans from the 9/11 aerial terrorist attacks on their homeland. What went wrong? Years of dominance have left the Western blocs complacent on air defence. Al-Qaeda applied the age old concept of attacking places where the enemy does not know how to defend.[32] No amount of air power could have responded in time to the synchronised attacks on the World Trade Centre and the Pentagon. Although the Americans and British forces strolled through Afghanistan and Iraq again with air superiority from 2001, the masterminds for the terror attacks remained elusive for a decade until Osama Bin laden was killed in 2011. Air power evolved into a tool for information superiority and time critical targeting. Focus was placed on the fusion of information between military air platforms to ground forces, intelligence agencies and homeland defence and security agencies. Accuracy and timeliness of intelligence to thwart and act swiftly against shadow operatives were required. Unmanned Aerial Vehicles (UAV) provided pervasiveness and persistence for such operations and thus explains the growth of UAV technology in recent years.

The level of integration between independent air, land and naval forces was a key factor to the successful outcome of a campaign. Each must not interfere with what the other does best, but each must work closely to achieve a single desired outcome.

CONCLUSION – THE FUTURE OF AIR POWER, WHAT WOULD BE THE EXPECTATIONS?

Diverted Attention

With the emphasis on Military Operations Other than War (MOOTW) and Civil-Military Relations (CMR), air power has also shifted its weight onto diplomacy.

Air forces around the world have increasingly rushed to demonstrate their airlifting responsiveness and mobility capabilities. From the 2004 Indian Ocean Tsunami to Typhoon Haiyan in 2014, there had been an increase of strategic airlifts flight for Humanitarian and Disaster Relief (HADR) operations. Air projection has become the dominant expectation for air power even though it had never received much fanfare since WWII, Korean, Vietnam and even the Gulf wars.[33] But the focus of Air power would need to be recalibrated if the world desires that the future expectations of air power be met.

Amidst the budget reduction for military spending within several states of the Western Blocs, China and Russia appear to be becoming more assertive over the South China Sea and Ukraine, respectively, in recent times.[34] If one remembers the lessons learnt about air power in the wars of proxies in Korea, Vietnam and the Middle East, it is easy to anticipate the difficulties that the budget constraints on air power development would bring.[35] Military aviation analysts have constantly sounded the alarm that military expenditures for China and Russia would be increasing over the next few decades.[36] These increases privilege the naval, air force and strategic nuclear force, which are instruments of advanced power projection.[37] In other words, the Western bloc air forces may not enjoy the benefit of being in-theatre first if war of proxies broke out. Air superiority would then have to be wrestled. Manoeuvre of surface forces would be impacted and casualties would increase. It would be far unimaginable if such crises developed into total wars.

Refocus on the Possible Threats

At the military strategy levels, the leaders must adjust their expectation of air power in the future as the delta in technological gap slowly closes up with the economical rise and increased military spending by China and Russia. Should the Western bloc and allies still achieve a swift and decisive air superiority in future wars against the China-Russian proxies? Will it be a war of slow attrition? The latter seems likely and perhaps the leaders of western blocs should refocus their air power resources into the regions of interests between China and Russia. Let's also not forget the lessons learnt during the inter-war period when colonial wars caused several European powers to lose their focus on strategic air power. The diversion into small AirLand campaigns against rebel ground forces had led to their deficiencies in long-range strategic bombing capabilities when WWII started.[38] In the current context, the concentration on limited wars against insurgencies and terrorism has similarly defused the readiness for total wars.

As such, even as the quest for superiority in aviation technology continues, the Western bloc air forces must continue to influence and guide the development of aviation technologies under the context of total war. To achieve a qualitative edge, technologies for strategic airpower must be continually translated into doctrines and routine training that emphasise on large force-on-force offensive and defensive manoeuvres.

For instance, the concept of integrated manned and unmanned operations in a large-force fighting environment can be developed further under the context of a total war. Strategic bombing and destruction of air defence systems may have to be conducted by advanced stealth unmanned bombers armed with precision weapons. A follow-on line of combined manned fighters and Unmanned Combat Aerial Vehicles (UCAV) may have to engage airborne enemy fighters in order to present a higher concentration of fire power, or to outflank the enemy fighters.

Air power evolved into a tool for information superiority and time critical targeting.

Overreliance on space and cyberspace technologies must also be cautioned. The current military aviation world is dominated by boundless developments in aviation technologies ranging from UAVs, Electronic Countermeasures (ECMs) and Electronic Counter-Countermeasures (ECCMs), Network-Centric systems, and even nanotechnology robotic systems. These technologies are heavily dependent on satellites and computer systems that can be destroyed in defiance to the weak laws and international treaties associated with these extra spaces. Harsh geographical environment also presents a myriad of limits on the potential of such aviation technologies.

Additionally, regular joint manoeuvring exercises must be constantly conducted together with their allied states to acquire local knowledge of the possible Area of Operations before the other belligerent does. This can be encouraged or disguised under the context of military diplomacy. After all, air diplomacy can be one facet of air power, if Moran agrees or if the aviation world so decides on it.[39]

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FACT OF SCIENCE FICTION: ENVISIONING THE NEXT TECHNOLOGICAL DISRUPTION IN THE PRESENT TENSE

by **ME6 Calvin Seah Ser Thong & MAJ Jonathan Quek Choon Keat**

Abstract:

In the current age of technology, advancements in technology have to be a priority for a nation's defence. To ensure that it is capable of defending itself against an opposing threat that may be more technologically advanced, defence planning and capability development are crucial. In the unforeseeable future, battles may be fought as seen in science fiction films such as *Star Wars*. In this essay, the authors discuss how military leaders can utilise science fiction as an inspiration for their nation's defence, whether it is possible for it to come into fruition, and why it should be an attribute that can be considered for military usage. To explain why science fiction could serve as an inspiration, the authors elaborate on the examples and applications of technology inspired from science fiction examples, in the military. Lastly, the authors highlight how the SAF can use Science Fiction prototyping as a potential feature of its future development.

Keywords: Defence Planning; Capability Development; Science Fiction Prototyping; Technological Inspiration

INTRODUCTION

> *"Fantasy is the impossible made probable. Science fiction is the improbable made possible."*
>
> *-Rod Serling, Television Producer and Creator of "The Twilight Zone"*[1]

Imagine a battlefield scene in the not-too-distant future. As your forces battle the adversary's, they swing their personal lightsabers to parry incoming projectiles, and activate personal energy force fields to protect themselves from explosive ordnance and directed energy weapons. To secure victory, you teleport a specially-programmed offensive robotic force into your opponent's command and control centre to deliver the *coup de grâce*. Does it all sound too fantastical to one day become reality, or will such a future remain a pipedream? The defence planning and capability development processes are forward-looking and decisions made in the present are intended to achieve results in the future. Defence and capability development planners inevitably have to envision a particular image of the future. Science fiction does not necessarily have to remain in the annals of popular culture—militaries can use it as a reference to postulate the next big disruption.

In this essay, we will explore (i) how science fiction can serve as the inspiration for creating imaginative concepts and scenarios of the future and (ii) if science fiction can indeed make 'the improbable made possible' for the military. We will first explore why science fiction could be the genre of choice for defence planning and capability development. Next, we will take a look at science fiction examples that

have become a reality for the present-day military. Finally, we will posit Science Fiction Prototyping as a potential framework that SAF defence and capability development planners can adopt to look for technological inspiration and for incorporation into its possible future technological realities.

DEFENCE PLANNING AND CAPABILITY DEVELOPMENT

To address the increasingly Volatile, Uncertain, Complex and Ambiguous (VUCA) strategic environment and guard against future threats, defence planning and capability development have to be forward-looking so that a military's resources and capabilities are built up for a future time horizon. These processes help militaries to set priorities for modernisation, readiness and sustainability, support processes and infrastructure activities.[2] Thus, defence and capability development planners inevitably have to envision a particular image of the future to aim towards. Most organisational decisions are based on the assumption that the future will be similar to the present or that past trends will continue into the future.

A notable case could be seen in how the Afghanistan campaign was carried out by the United States (US) military. The US military's similar use of local forces to do the fighting on the ground while it supplied advice and air support was said to have conjured up the ghost of the Vietnam War.[3] The rapid technological and social changes and complex security environment make extended discussion on the obvious weaknesses in this approach superfluous. The result is that the majority of predicted future work lacks both in-depth understanding and a progressive outlook. It is with these current deficiencies and limitations that we believe that science fiction could be a boon to the defence planning and capability development processes.

WHY SCIENCE FICTION?

> *"Science fiction is held in low regard as a branch of literature, and perhaps it deserves this critical contempt. But if we view it as a kind of sociology of the future, rather than as literature, science fiction has immense value as a mind-stretching force for the creation of the habit of anticipation."*
>
> *-Alvin Toffler, Author and Futurist, in "Future Shock"[4]*

While there have been notable examples of transference from science fiction into real current technologies, is there value to learn from science fiction? Or could it be just a lot of hoopla? Science fiction is a genre of fiction that spans the spectrum from the plausible to the improbable and it gets its grounding from science-based fact or theory.[5] Science Fiction stories typically use futuristic societal and scientific scenarios set in a future time horizon as the foundation of a storyline. As compared with the genre of Fantasy, advancements in technology have made the line between science and fiction thinner and realisable.[6]

Science fiction stories in novels, comics, television shows and blockbuster movies, often involving partially true theories of science, have often become fodder for real-life experimentation of new concepts.[7] Look at how the robots and droids from the science fiction world have inspired the proliferation of unmanned technology in our everyday lives—they range from tools for weather forecasting to law enforcement and the military.[8] In fact, many technologies we see today have taken life from works of science fiction written decades ago. Notable examples include Arthur C. Clarke's description of Geostationary Satellite Communications in 1945, as well as the invention of the Thomas A. Swift's Electric

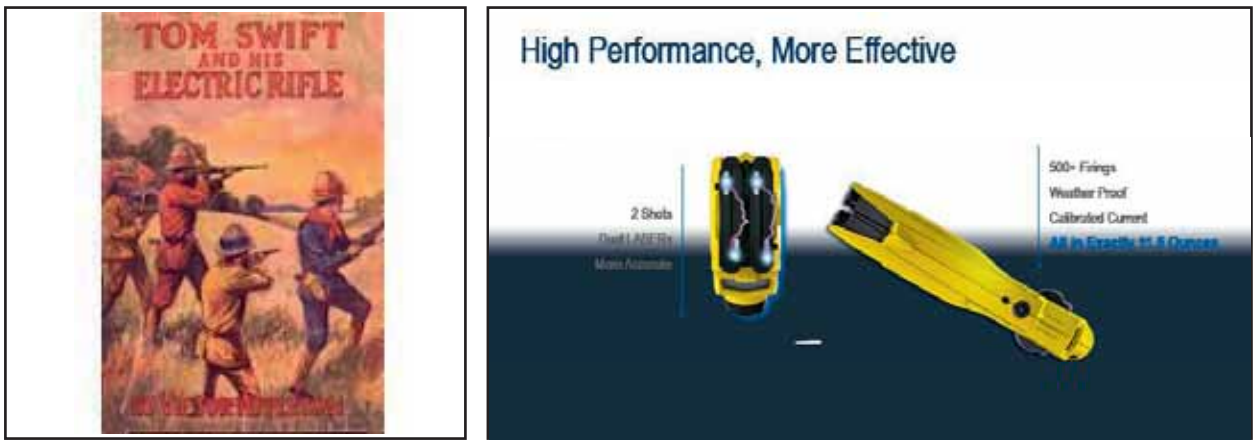

Figure 1: The TASER and origin of its name.[9]

Rifle (TASER) by Jack Cover, which he named after juvenile novel hero Thomas Swift (see *Figure 1*).[10]

As stated in London-based scholar Sardar's First Law of Future Studies—future studies are wicked. He noted that, 'Almost all the problems we face nowadays are complex, interconnected, contradictory, located in an uncertain environment and embedded in landscapes that are rapidly changing.'[11] Solving wicked problems require a change of mindset, as solving these wicked problems usually create a plethora of new problems.[12] Currently, the limitation of the potential of science fiction is that so much future research is carried out in corporate environments for private ends, and not enough is being done to tap its potential for defence planning and capability development in the military.

To address the increasingly Volatile, Uncertain, Complex and Ambiguous strategic environment and guard against future threats, defence planning and capability development have to be forward-looking so that a military's resources and capabilities are built up for a future time horizon.

MILITARY TECHNOLOGY INSPIRED BY SCIENCE FICTION

In the present, one would think of scenes involving droids, super-beings or iterations of future technology when considering science fiction, undoubtedly made popular by stories that have gone from print to screen in movies such as *Star Wars*, *Star Trek*, *Total Recall*, *The Terminator*, *I, Robot* and *Marvel's The Avengers*. Indeed, science fiction has become military reality with examples such as the Active Denial System (ADS), exoskeletons and humanoid robots.[13] Let us now take a look at some of the inventions currently in development by the military that have been inspired by science fiction movies.

From *Iron Man* – The Iron Man Suit

The character Iron Man, from Marvel's comic series and movies of the same name, has been an inspiration for militaries to create soldiers of the future. In 2013, the US military enlisted the help of the special effects team from the Iron Man movie to attempt to make Tony Stark's lightweight body armour a reality, as part of the project known as the Tactical Assault Light Operator Suit (TALOS) (see *Figure 2*). The TALOS was conceptualised to provide comprehensive ballistic protection, peerless tactical capabilities and

Figure 2: The Tactical Assault Light Operator Suit.[14]

ultimately to enhance the strategic effectiveness of the Special Operations Forces (SOF). It is reported that the programme has attracted interest from Lockheed Martin, General Dynamics and Raytheon, and is on track for prototype suits to be ready by 2018.[15]

From *Star Wars* and *Star Trek* – Force Fields and Laser Beams

Figure 3: Electromagnetic Force Field Armour.[16]

The force fields and laser beams that we have seen in *Star Wars* and *Star Trek* have inspired researchers at the Defence Science and Technology Laboratory (DSTL) of the United Kingdom (UK) to create a new type of armour that uses pulses of electrical energy to limit the damage from rockets, missiles and other ammunition. They have incorporated supercapacitors into the armour of vehicles that can produce a strong protective electromagnetic field when an incoming threat to the vehicle is detected (see *Figure 3*). Trials are currently ongoing and by operationalising these force fields, DSTL is aiming to reduce the weight of armoured vehicles by 70 percent over the next decade.[17]

It has been reported that the US Air Force will demonstrate firing a high-powered laser from a fighter jet in 2021 (See *Figure 4*). This is part of the US Air Force Research Laboratory's 'Shield' effort, sponsored by Air Combat Command and is the culmination of years of development of 'Star Wars' technology. The Air Force is leveraging on work by the other services on similar programmes. For example, the Army's High Energy Laser Mobile Demonstrator (HELMD) uses a 10 kilowatt laser installed on an

Oshkosh tactical military vehicle. Meanwhile, the Marine Corps is working to fit a laser on a Humvee. If successful, the Air Force could have a significant advantage in efficiency and speed of engagement. As the laser is generated electrically in the jet's engines, operators can protect their asset without needing to carry additional kinetic weapons.[18]

Figure 4: US Air Force envisioned demonstration of a high-powered laser on a fighter aircraft in 2021.[19]

FROM *Star Wars* – HOVER BIKES

The US Army's Research Lab is currently working with Malloy Aeronautics and Survice Engineering Company to create 'a new class of Tactical Reconnaissance Vehicle (TRV).'[20] The Hover Bike (see *Figure 5*), which draws its inspiration from the speeder bikes from *Star Wars,* is relatively low-cost compared to other military vehicles and it will be able to possible fly with or without a pilot, carry payloads, and manoeuvre through tight spaces. The Hover Bike is therefore envisaged to be a versatile platform used in a variety of missions.[21]

Figure 5: Hover Bike.[22]

FROM *The Transformers* – Transforming Helicopter

The US military has been said to have a keen interest in the science behind *The Transformers* series.[23] In this regard, Advanced Tactics from California had announced their creation of a helicopter/truck transforming drone that is designed to haul supplies, pick up casualties and wounded soldiers and give support to combat missions. With eight helicopter rotors and four-wheel drive capability, Advanced Tactics has dubbed it the 'Black Knight Transformer. It was commissioned by the military under a project grant for the US Army's Telemedicine and Advanced Technology Research Centre (ATREC) and is intended in part for Special Forces operations, which will be able to benefit from the adaptable and covert capabilities of an all-terrain vehicle combined with helicopter vertical take-off and landing capabilities.[24]

SCIENCE FICTION PROTOTYPING

With the untapped potential of science fiction, we are suggesting an alternative for the defence planning and capability development processes, which already involve explicit and systematic approaches to the study of the future. This is not because we already know how to explore the future, but because it remains vital to do so. Without studies of the future, the tendency may be to rely on random methods or take on a single view of the future, which would result in limiting the freedom of choice for planning. We thus suggest the use of Science Fiction Prototyping as an alternative method to be used during defence planning and capability development.

Brian David Johnson from Intel created the concept of Science Fiction Prototyping (see *Figure 6*) from a personal process he used as a futurist in the company, elaborating the idea in the textbook *"Science Fiction Prototyping: Designing the Future with Science Fiction."*[25] In a nutshell, it is an approach where an organisation employs science fiction writers to do exploratory stories in an area of interest.[26] A Science Fiction Prototype uses science fiction based explicitly on scientific facts as a design and decision tool in

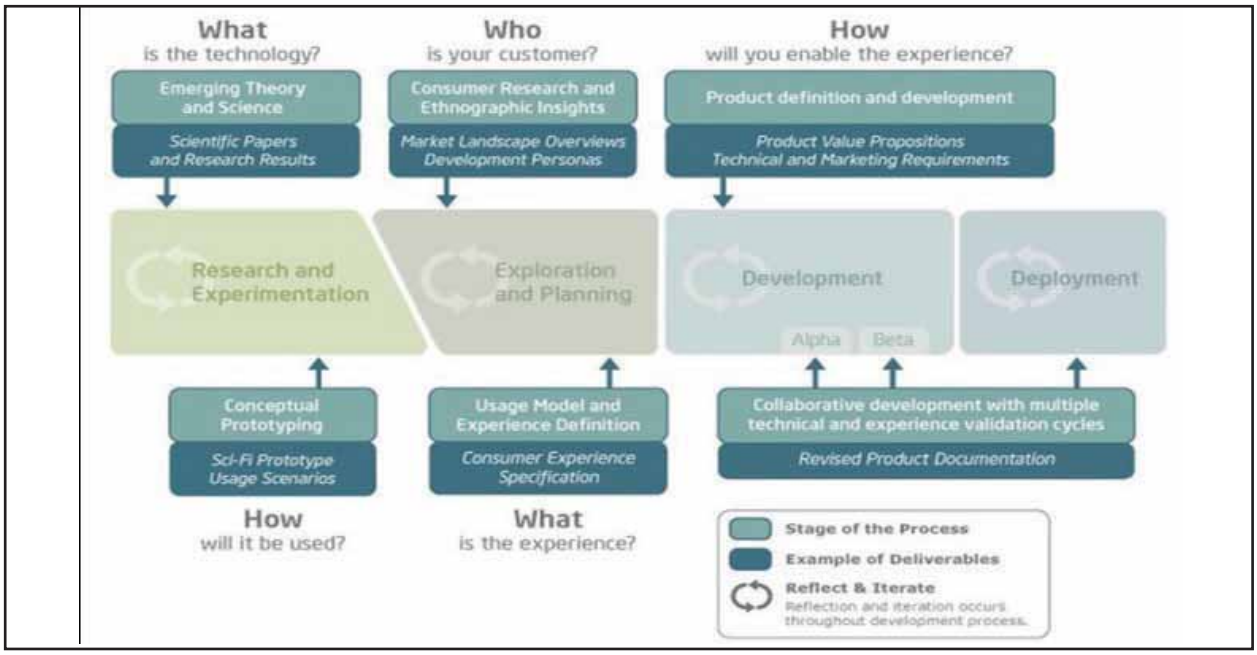

Figure 6: Science Fiction Prototyping Framework.[27]

the choosing and development of technologies by militaries.

The science fiction prototype asks how technology will be used and it can provide a virtual reality in which the implications, problems and benefits of the technology are explored. The exploration could uncover both the best case and worst case scenarios but it can also explore the subtleties of how militaries and countries will use and interact with the technology in the future. They provide possible perspectives on the technology in question and will feed into its development. Ultimately, science fiction prototyping can provide militaries with a vision of the future that they can actually build—a vision where militaries see what possible realities science and technology can produce. Thus, Science Fiction Prototyping can be seen to nicely complement scenario planning as it involves scenario planning but through science fiction lenses.

The premise for Science Fiction Prototyping, as found by researchers at the Ohio State University, is that story-telling is a powerful way to change ingrained beliefs and that fiction is more effective at changing beliefs than non-fiction.[28] Science Fiction Prototyping has started to gain traction and has been used by universities, corporations such as Intel, government agencies of various countries, as well as the Canadian and US militaries. In the Canadian Military's use of Science Fiction Prototyping to consider the future of command and control and military operations, two short novels titled, "*Crisis in Zefra*" and "*Crisis in Urlia*" were written.[29]

Use of The Science Fiction Prototyping Process

In an undergraduate computer security course at the University of Washington, Science Fiction Prototyping was used to facilitate students' identification and reasoning of the potential security risks to their systems. This exercise subsequently helped them to work with technical experts to tackle the threats. As the learning is derived from the planning of the science fiction story, rather than actual writing of the story, students were told to submit an assignment with (1) complete outlines for the short stories, and (2) detailed write-ups reflecting upon the lessons they learned about the technologies when developing the stories.[30] A summarised description of the process is presented as follows:

1. Selection of Topic

The students selected a technology to focus on which had to be emerging and forward-looking, had to interact with other technologies, people and society in non-trivial ways and be related to computer security.

2. Mechanics: The Story

This process aimed to deliver an outline which captured the idea behind the stories and put it into a plot. The idea for the stories came from the technology that the students chose to study. The plot of the story is what is explored in the outline and allows the students to delve into the broader contextual issues surrounding the technology.

The students planned their stories based on the following guidelines:

- What are the implications of the mass adoption of the technology?
- What is the worst thing that could go wrong and how would it affect the people and locations in the story?
- What is the best thing that could happen and how would it better the lives of the people and locations of the story?
- If this technology were in an average home how would it actually work?

The students then culminated their stories with complete outlines that provide a step-by-step description of what happened in their stories.

3. Deliverables

The students had two submissions with different deadlines. In the first submission, they submitted a short description (at most one paragraph) of the technology that they planned to explore (including background references), a short (at most one paragraph) description of the broader contextual issues that they anticipated encountering, and a short (at most one paragraph) synopsis of the envisioned story, including key plot points and other objects. In the second submission, they submitted a short description of the technology that they explored (in case the choice of technology changed between the first and second deadlines) and a story outline as earlier described.

The premise for Science Fiction Prototyping, as found by researchers at the Ohio State University, is that story-telling is a powerful way to change ingrained beliefs and that fiction is more effective at changing beliefs than non-fiction.

An Illustration of Science Fiction Prototyping

An illustration of a science fiction story applied to the military could be as follows:

Act 1 (Story and exploration of technology):

Current world demographic trends have shown that the population of the world will be increasingly urban and the urban battle is a challenge that militaries must address. In an urban battle, soldiers need to secure a building in which the enemy commander is located. However, the soldiers have to scale the walls of the building as all other means of ascent have been denied by the enemy. They therefore put on their gloves which allow them to scale walls just like how Spider-man could scale and move along walls.

Plot Point 1 (Implications and Areas of Exploration):

With the gloves, the soldiers can easily scale the walls to reach the enemy commander. This technology can be further used by the Home Team officers for search and rescue missions or to arrest criminals. The implication of the technology to society is that access to such technology should be tightly controlled so as to preclude it from being used for criminal intent.

Figure 7: Scaling of a Vertical Glass Wall using Specially Designed Gloves.[31]

Such a technology could potentially be realised using biomimicry to study lizards or insects. In fact, such a technology was demonstrated for the scaling of vertical glass walls. The technology was developed by a US team led by Dr Elliot Hawkes from Stanford University (see *Figure 7*).

ENABLERS FOR SUCCESSFUL SCIENCE FICTION PROTOTYPING

An iterative Science and Technology Roadmap recommended by the Albright Strategy Group is depicted in *Figure 8*. Based on the earlier description of the science fiction prototyping process and roadmap, the following are the enablers that could ensure that the process is successful.

Needs Analysis / Threat Modelling

To start off the process, either a needs analysis or threat modelling could be done to choose possible technology classes to focus on for the stories to be drafted. This could be done using a Strength, Weakness, Opportunity and Threat (SWOT) analysis, which is typically used to aid strategic planning and decision making.[32]

Science Fiction Planners

As the science fiction stories were being told take place in the future, what is crafted is largely a product of the writers' imaginations. Thus the writers should be planners who are familiar with military technologies and concepts and yet are exposed to a myriad of science fiction. They should ideally have a vision of the future and possess vivid imaginations. It is noteworthy that even though the stories are to be science-fictional, they should still be detailed yet believable, or ultimately they will become too unbelievable.[33]

Risk Analysis

It is not enough to just think of the technology to be looked into, it is equally important to look at the risks and uncertainties that may arise from the adoption of the specific technology. These could include risks such as potential side effects, possible supportability issues or even scalability. Once the various risks and uncertainties have been identified, next would be to prioritise them and to come out with alternative plans or initiatives to manage or mitigate them. However, as all new technology

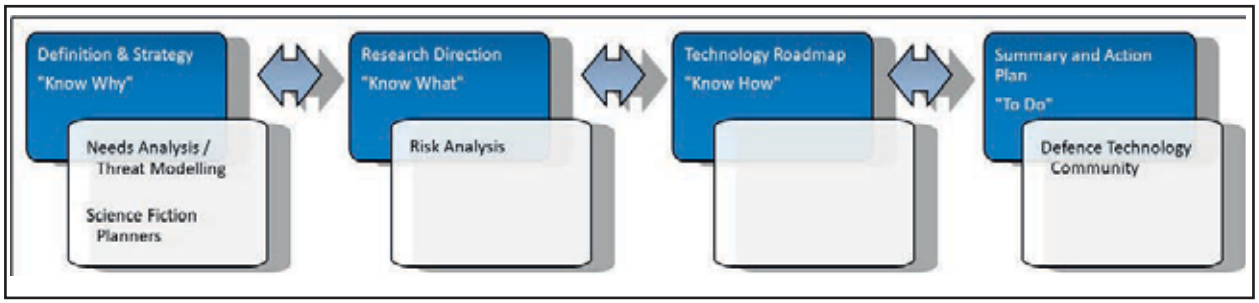

Figure 8: Science and Technology Capability Roadmap.[34]

exploration comes with associated risk, there needs to be a threshold of acceptance. The key would then be to analyse probabilities and weigh the costs and benefits.[35]

Science Fiction Prototyping can function as a systematic method in which to consider and choose futuristic technologies to be adopted in the SAF's future plans, by way of scenario planning through science fiction lenses

Defence Technology Communities

As illustrated in the earlier examples, many technologies based on science fiction could not be realised just by militaries alone, but rather, it is necessary for a strong defence technology community that sits within the military, as well as external to the military, to collaborate in the processes that lead to the realisation of such future technologies. Within the military, agencies such as the Defense Advanced Research Projects Agency (DARPA) from the US Department of Defense (DoD) or the DSTL from the UK Ministry of Defence would form the thinkers behind the stories. External to the military would be military contractors who can help actualise the ideas generated into actual products.

SCIENCE FICTION PROTOTYPING FOR THE SAF

From the early days of the Singapore Armed Forces (SAF), Dr Goh Keng Swee was convinced that defence technology was important for a country's defence and that a country could gain the upper hand in modern warfare if it possessed superior technology. This led to the creation of Project Magpie in 1971, a top secret grouping of pioneering engineers who were to develop cutting edge defence technology for the SAF.[36] This perspective was echoed by the SAF's former Chief Defence Scientist Professor Lui Pao Chuen, who stated that the use of technology was critical in helping the SAF overcome the limitations of a small population and develop to what it is today.[37] There have also been various points made by then Permanent Secretary (Defence Development), Mr Ng Chee Khern, that the SAF needs to leverage on technology to build its capabilities and platforms.

Science Fiction Prototyping can function as a systematic method in which to consider and choose futuristic technologies to be adopted in the SAF's future plans, by way of scenario planning through science fiction lenses. Scenario planning is not a new concept in the Singapore Government and it has already been used in strategic planning purposes since the late 1980s to postulate what could possibly happen in the future.[38] The adoption of science fiction

prototyping thus represents the elegant connection between trying 'to achieve a quantum leap' the SAF capabilities and 'innovatively applying technology to bring the SAF forward in the future,' whilst giving due consideration for the future operating environment and challenges.[39]

CONCLUSION

> *"We must resist the temptation to be seduced by straight lines. Tomorrow will not be just an extension of today. Trends, no matter how powerful, do not continue in a straight line."*
>
> *-Alvin Toffler, Author and Futurist in "The Third Wave"*[40]

As earlier quoted from Rod Serling, science fiction is the improbable made probable. Thus, science fiction is indeed a viable genre of choice for the exploration of the technological future for militaries. With the rich avenues of science fiction stories that fuel our imagination, militaries can indeed look at science fiction for inspiration to envision, forecast or even guard against possible technological disruptions. Through our exploration of Science Fiction Prototyping, we believe that it is a potential scenario-planning framework that militaries and indeed, the SAF, can adopt to realise new concepts and technologies.

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DETERRENCE: AN ARCHAIC CONCEPT OR A RELEVANT STRATEGY?

by **MAJ Jamie Lee Wenjie**

Abstract:

In this essay, the author analyses the relevance of conventional deterrence theory in an increasingly multi-polar world, fraught with new military and security challenges. Due to various powers jostling for spheres of influence to serve their own interests, within the global arena, the author acknowledges that the applicability and effectiveness of conventional deterrence theory in preventing war may be uncertain. However, he feels that with the application of certain practices like having a clear policy direction and strengthening confidence building measures, there can be positive results for deterrence. While the strategies outlined are by no means a one size fit all solution that would immediately render deterrence relevant and effective against all conflicts, the author feels that it is still highly relevant in today's context. In the constantly evolving security and geopolitical landscape, it is necessary for deterrence strategies to constantly keep up with the times as well. What countries would need to do is to revisit the fundamentals of deterrence that have served the world well for the past centuries and relearn the basics of applying deterrence theory in the modern world. The author concludes that deterrence is still a relevant strategy and it is not yet time to pass it off as an archaic museum relic.

Keywords: Volatile; Aggression; Impeded; Paradoxical; Relevant

INTRODUCTION

For decades, deterrence has been the buttress of many successful defence policies worldwide including that of Singapore, Israel and the North Atlantic Treaty Organisation (NATO).[1] However, given the paradigm shift in the nature of existing security threats, as well as a changing world order of military superpowers, the relevance and applicability of deterrence today in preserving the peace, whilst still achieving military and/or political objectives has come under intense scrutiny. From recent conflicts, it is evident that the whole gamut of deterrence options is akin to a double-edged sword which can either yield successful protection or the alienation and even provocation of potential belligerents. Therefore, in our perpetual pursuit for security and peace for our nation, is deterrence still a viable strategy in today's context or is it an archaic concept suited for a bygone era?

DETERRENCE THEORY

As the famed military strategist and tactician, Sun Tzu wrote in his famous book '*The Art of War*': 'The supreme art of war is to subdue the enemy without fighting.'[2] Indeed, since ancient times, the concept of deterrence and coercion to achieve military objectives

without embarking on full-scale military conflict has been the cornerstone of many military strategies.[3] Today, the classical definition of deterrence is widely accepted as the 'persuasion of one's opponent that the costs and/or risks of a given course of action he might take outweigh its benefits.'[4]

As noted by Solomon, a brisk and emphatic repulsion of aggression, accompanied by caustic after-effects for the aggressor is not the sole means of deterrence.[5] Defenders can also rely upon the denial of military objectives to the potential aggressor by utilising the prospect of any conflict degenerating into a highly treacherous, costly and protracted war. These two tenets of deterrence, more commonly known as deterrence by punishment and denial respectively, form the basis of modern deterrence theory.

In the previous decades of conflict dominated by conventional and structurally symmetric warfare, deterrence by punishment and denial have yielded desirable results of averting potentially disastrous conflict.[6]

Most notably during the Cold War of the 1960s and 1970s, with the advent of nuclear weapons, the concept of Mutually Assured Destruction (MAD), which essentially encapsulates both punitive deterrence and deterrence by denial, successfully kept the two nuclear powers at bay.[7]

In modern day foreign policy, deterrence comes under further classification which distinguishes between general and immediate deterrence, as well as between direct and extended deterrence.[8] As defined by Patrick Morgan, a long standing expert on deterrence theory and international security matters, general deterrence is a stance where 'an actor maintains a broad military capability and issues broad threats of a punitive response to an attack to keep anyone from seriously thinking about attacking.'[9] Immediate deterrence, on the other hand, refers to the case where 'the actor has a military capability and issues threats to a specific opponent when the opponent is already contemplating and preparing to attack.'[10] Direct and extended deterrence, which is highly relevant in today's multi-polar world of major powers, refers to prevention of an attack on oneself or a third party respectively.

It is evident that the world we live in today is vastly different from that of the Cold War era. Gone is the structured bi-polar superpower hegemony dominated by the Soviets and Americans. The emergence of China as a military superpower has engendered an added dimension of uncertainty in the global power balance. Moreover, the world has seen a rapid emergence of increasingly organised and potent non-state actors in an increasingly asymmetric conflict arena.[11] With the ever increasing prevalence of such trends, many have begun to question if the decades-old concept of classic military deterrence is still relevant for today's security context.[12] Hence, this essay aims to study the relevance of conventional deterrence theory in an increasingly multi-polar world, fraught with new military and security challenges posed by the surge of non-state belligerents.

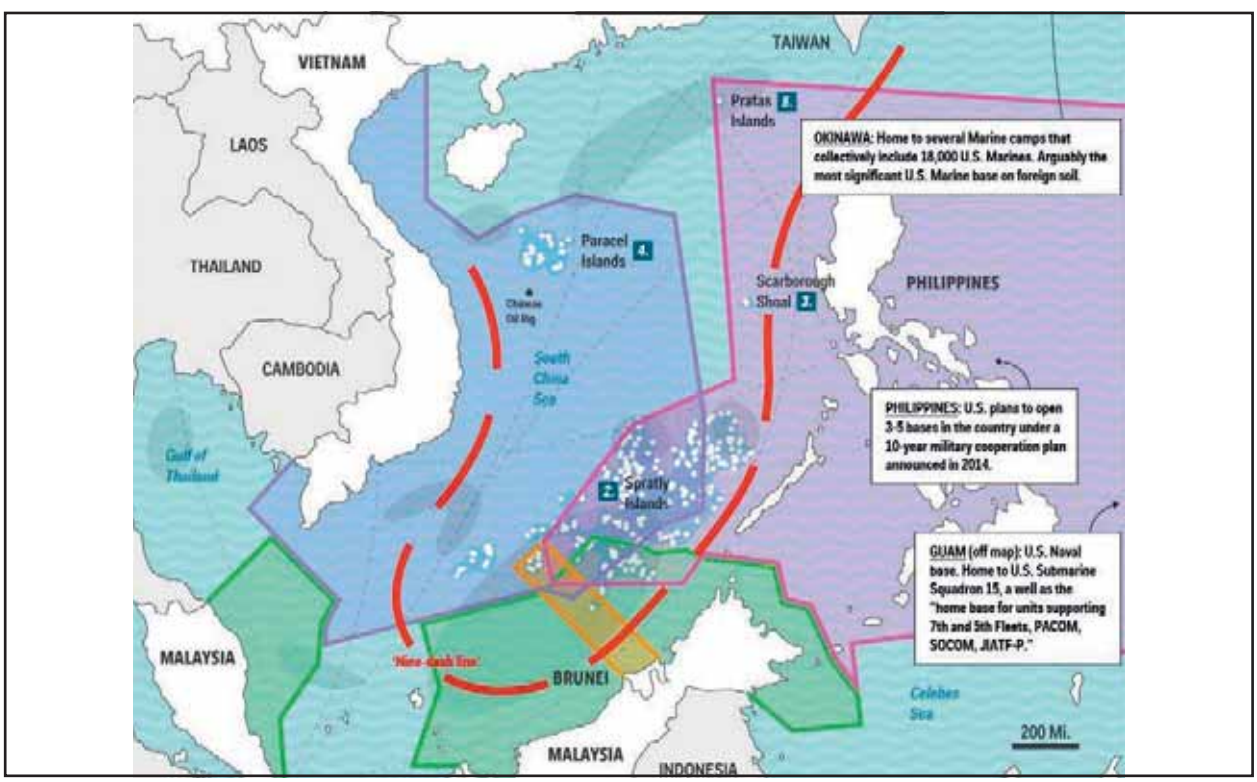
THE NEW FACE OF GLOBAL CONFLICT

The world is seeing a seismic shift in the global power balance, unmatched in significance since the collapse of the Soviet Union in 1991 which ended the era of bipolar geopolitics.[13] Instead, multiple global powers loom large within the military arena, with China and Russia, among others, jostling for some sphere of influence to serve their own interests.[14]

Russia has risen from the ashes post-Soviet economic and political turmoil to re-emerge as a credible world power.[15] With a vast nuclear arsenal

and a sizeable conventional military capability, Russia has recently become well-poised to challenge the American hegemony in favour of a multipolar world. Russia's recent hawkish assertion of power, as seen in the invasion of Georgia in 2008 and its annexation of Crimea in 2014, despite vehement protests from the international community, are bold attempts at establishing legitimacy for itself as a regional, if not global, power.[16] Moreover, Russia's snub of the existing US (United States)-led anti-Islamic State in Iraq and Syria (ISIS) coalition, opting for a unilateral military intervention in Syria, is seen as a desire to 'discredit America's stewardship of the international order.'[17] Indeed, the Kremlin's pursuit of a more aggressive foreign policy is a clear signal of intent to once again cast a shadow of a global superpower on the world.

Halfway across the globe in the Far East, the South China Sea (SCS) is becoming a proxy theatre where China is challenging American dominance and influence. With a burgeoning economy, large swathes of territory and a rapid military buildup, China is fast becoming a global power whose economic and military might be a force to be reckoned with. They, too, have a desire to challenge the US's dominant global position and establish its own sphere of influence in its region. Above and beyond their respective claims of rightful sovereignty, the alignment of most countries embroiled in the SCS island disputes with the US irks China. This has engendered China's increasingly assertive military actions in the region, including the land filling and building of airstrips and garrisons on these disputed islands, as well as the stationing of naval vessels in these disputed waters.[19] China's combative rhetoric in the region, firmly insisting its sovereignty over the islands based on the nine-dashed-line and refusing to partake in



China's Maritime Claims in the South China Sea.[18]

any international arbitration, is an ostensible assault to traditional American leadership in the region.[20] As observed by the Economist newspaper, 'China is asserting that in its region, for the island disputes as in other things, it now sets the rules.'[21]

In modern day foreign policy, deterrence comes under further classification which distinguishes between general and immediate deterrence, as well as between direct and extended deterrence.

Although the issue of whether Russia and China can be truly considered as global powers, comparable to the US, is still under great contention, it is indubitable that the long standing American hegemony is facing erosion and the global world order is gradually becoming more multipolar. This structural shift in power balance could possibly upset the status quo of peace maintained by deterrence. What was achieved through effective deterrence in the past, might now become dangerous brinksmanship as rising military powers start to flex its muscle in retaliation.

Apart from the increasing number of powers jostling for space in the military arena, the advent of an asymmetric conflict structures as a central characteristic of today's warfare further complicates matters. Of late, dominating the conflict arena are structurally asymmetric wars between state and non-state actors, resorting to terrorism to achieve their aims of disruption and destruction. For example, the Syrian Civil War involving multiple rebel factions, government forces, extremists groups, as well as a multitude of foreign military intervention sees both conventional strikes on Syrian soil as well as terrorist retaliation abroad targeted at countries in the anti-ISIS coalition.[22] The pervasion of such multi-faceted and abstruse conflict relations between warring entities of today's wars adds to the fog of war, where it might be difficult to apply deterrence appropriately to achieve one's aim.

Therefore, given the synthesis of a multi-polar world order, coupled with the growth of highly convoluted conflict structures, the applicability and effectiveness of conventional deterrence theory in preventing war has come under question.

WHERE DETERRENCE FAILS

Underpinning a successful deterrence strategy are the concepts of capability, credibility and communication.[23] The defender must possess a sufficient scope, depth and ability of military force to repel any attacks. Its declared resolve and intent to protect its objective must be perceived as plausible by the potential aggressor. Lastly, the defender's capability and resolution to deter by denial or punishment must be effectively communicated to the likely adversary such that the adversary comprehensively understands the perils and costs of attempting any provocative actions. Each of these 3 concepts are necessary but not sufficient, by themselves alone, for successful deterrence. Only when the defender achieves all 3 essential components, can deterrence stand a chance of success.

Military capabilities worldwide have been on a constant upward trajectory since historical times. Recent economic troubles have done little to dampen the ever intensifying modernisation and advancement of military hardware and doctrines. Although the capability of an armed force is certainly more than just its hardware, the flourish of new military technology in the 21st century does serve as some indicator of the advancement in military capabilities. The ascent of unmanned combat aerial vehicles (UCAVs) and 5th generation stealth fighters into ubiquity in the battlefield, the evolution of naval modernity from frigates to multi-mission stealth

A Northrop MQ-25 Stingray UCAV during a routine flight.[25]

ships like the Zumwalt-class guided missile destroyers and the venture into directed energy weapons for anti-personnel and anti-vehicle applications, are stellar examples of how military technology is racing at a feverish pace, improving military capabilities worldwide as countries try to outdo one another.[24] Coupled with the development of relatively new battle concepts like information and network-centric warfare, cyber warfare and 'Joint Concept for Access and Maneuver in the Global Commons' (JAM-GC) strategies, militaries today are incontrovertibly more advanced and capable for a new realm of warfare.[26] Hence, it is safe to say, that the lack of capability of an armed force resulting in the failure of deterrence (both extended and direct) is a remote possibility. Even for highly asymmetric conflict structures where the defender is much weaker than the belligerent, today's multi-polar world implies that there would almost certainly be a major power or alliance that is aligned or allied with the defender. Hence, in this case, extended deterrence offered by the major power would account for the lack of military capability of the defender.

Instead, it is often the lack of credibility and/or communication that precipitates failed deterrence. This is especially true for the multipolar global construct today where multiple entities in the play field have different conflicting aims, with the newer powers trying to discredit the current American world leadership and establish themselves some regional sphere of influence. In the bipolar Cold War Era and the subsequent post-Soviet unipolar world of American hegemony, the focal point of almost all international decisions was concentrated between two or fewer superpowers' influence. This engendered a 'narrow in focus, fairly predictable and stable' geopolitical environment in which even if the major powers did not engage directly, actions of individual states acted like proxies based on either ideologies that they aligned themselves with.[27]

This convoluted relationship among multiple world and regional powers in today's global world order have created a broad and unpredictable environment, spawning an increase in 'strategic uncertainty and complexity.'[28] This muddles individual states' decision-making process in effectively applying deterrence which has been the culprit behind the attackers' erroneous assessment of the defender's credibility and communication resulting in instances of failed deterrence.

Case Study 1: 2014 Russo-Ukrainian Conflict

Following the 2014 Ukrainian political revolution, the annexation of Crimea and the war in Donbass have been condemned by most of the world, with Russia's actions being widely regarded as an explicit violation of Ukrainian sovereignty.[29] This has been considered by many as an example of the failure of extended deterrence offered by the NATO and the US. In this multi-polar proxy conflict between the West and Russia, the uncertainty of its complicated ramifications on the global status quo of peace, engendered the West's reluctance to engage another military power over a non-vital interest, thereby reducing the credibility of its deterrence (which Russia correctly assessed).[30] The meek threats of retaliation and economic sanctions, did little to reel

in the expansionism of the Kremlin and ultimately Russia succeeded in employing the 'salami-slicing' tactic to erode the West's weak deterrence.[31] Suppose that the nature of such a conflict was more unipolar, the outcome of the conflict could have been very different.

Ukrainian soldiers on patrol outside the Ukrainian city of Debaltseve.[32]

Moreover, the shift in the nature of security threats to one dominated by transnational terrorism and ideological warfare has rendered conventional deterrence policies, originally devised for structurally symmetric conflicts involving nations, somewhat impotent. The key assumption behind conventional deterrence theory is that both parties in a conflict would act rationally to maximise its own benefit or reduce its losses within a 'legalistic and state-centric framework.'[33] In this case, deterrence by punishment or denial would be effective in increasing the costs or reducing the benefits of a belligerent act respectively, thereby allowing the cost-benefit analysis to keep the potential aggressor in check. However, terrorist organisations like ISIS, which are driven by extremist values, tend to be deviant from this assumption. They thrive on incessant and persistent barbaric acts against humanity and culture to extort from governments and strike fear in the hearts of the common people. Given the spate of suicide terrorist missions deep in the heart of European and American territory, they are therefore ostensibly suicidal in their fervent efforts to achieve their political aims.[34] Therefore, threats of punishment or objective denial would just create a negative-sum game where both parties suffer ever deepening losses. However, it is argued that the perceived irrationality of terrorist groups, which render deterrence ineffective is actually, a final choice of desperation where no better alternatives exist after a rational thought progression through the strategic options they have. Hence, attempts at punitive deterrence would help them isolate the sole possibility of advancing their political goals which is through suicidal or atrocious means.

A handful of scholars on this subject are arguing that such punitive measures will only create a disproportionate backlash of radicalisation and alienation of specific racial or religious group, when they feel that these coercive policies are deepening their grievances. Modern day terrorist organisations like ISIS are quick to hijack such circumstances for their own benefit in recruiting new members. This phenomenon is common in Europe and the US where coercive and repressive punishments against Muslim extremism have created newer pockets of self-radicalisation due to their sense of victimisation.[35] This, in turn, further exacerbates the terrorism problem in a vicious cycle. Instead, the idea of employing rehabilitation and de-radicalisation education programmes in lieu of draconian anti-terror policies is being mooted as more favourable to 'break the cycle of terrorist recruitment.'[36]

Case Study 2: The War Against ISIS

The ongoing war against ISIS in Syria and Iraq stems from a strategy composed mainly of airstrikes by the US led coalition on ISIS targets, in retaliation for attacks on their home soil. On the home front,

western intelligence also actively tracks and prosecute individuals who have possible terror links. This key strategy of deterrence by punishment has not had much concrete gains in the Middle East, nor has it seen an abatement of the support for ISIS by self-radicalised individuals. Instead, since 2014, the US has seen more than 150 citizens and permanent residents leaving for Syria to fight and the Anti-Defamation League based in New York has released a report stating that the number of homegrown self-radicalised recruits who have been charged with terror-related offences just 'represent a small subset of the total number of American citizens and residents government officials estimate have engaged in activity with or on behalf of international terrorist groups.'[37]

Underpinning a successful deterrence strategy are the concepts of capability, credibility and communication.

INGREDIENTS FOR SUCCESS

Given the arguments presented in the preceding paragraphs, it is still premature to write off deterrence as an archaic concept with little or no use today. In the following text, we shall examine how deterrence can and should be employed well within today's geopolitical context to yield desirable results.

The multipolar geopolitical world order, dominated by China, Russia the US and complicated by military alliances, with member countries all having political and military agendas of their own, has indeed contributed to the uncertainty and complexity that has limited deterrence's success in several conflicts. However, on closer inspection, there are other factors that begets failed deterrence. These are the few prerequisites that countries can take for deterrence to be wielded as an effective tool:

1. Clear Policy Direction

More often than not, in disagreements between multiple large powers, one party might have an insufficiently clear stand on its position on the issue. Failure to draw clear 'red lines' on conflict boundaries will result in a weak and incoherent portrayal of deterrence which the potential belligerent might exploit. It has been argue that this has been the case in the Russo-Ukrainian Conflict and the South China Sea Conflict. The US merely states its desire for a peaceful resolution and support of each nation's sovereignty. It does not have a hard stance on the 'out-of-bound markers' beyond which it will provoke a military response.[38] Without a firm policy direction, attempts to anchor its authority in the region like the sailing of an American warship through the disputed SCS waters claimed by China could be misinterpreted easily, resulting in a dangerous game of brinksmanship. As such, it has been argue that the credibility of its extended deterrence is debilitated and both China and Russia have taken slices out of the US's salami of extended deterrence in both conflicts.

On the other hand, in the Cold War in the 1950s, the USSR was a potent and credible nuclear threat. However, the US's resolute demonstration of its intent and will to deter them militarily did successfully deter a war from breaking out. Countries have seemingly forgotten that the fundamental of a strong deterrent posture is an unambiguous threat of ferocious retaliation against potential aggression. Hence, a multipolar world was not the direct cause of failed deterrence today. It merely sets the stage for indecision and ambivalence in foreign policy which ultimately caused the loss of a credible deterrence. Politicians and military leaders have forgotten the basics of deterrence that has proven effective in the past, and allowed the current complex geopolitics to obscure their decision making process.

2. Confidence Building Measures (CBM)

Multilateral or bilateral CBMs can ameliorate tense conflicts and promote mutual reassurance between countries. This will address the suspicions and fears directly that often drive a potential aggressor to take action. CBMs can involve greater transparency in force structures, military exercise purpose or decision-making processes.[39] Implementing CBMs among global powers however, also imply the acceptance by the incumbent hegemon of the newer superpowers' position in the global world order, including their desire for some sphere of influence. This is mainly lacking in the current global security context where the US and NATO in the west are gradually granting more ex-Soviet states membership but continuously alienate Russia as the common enemy.[40] Such actions only serve to breed suspicion among Russia and the West and aggravate existing political friction. In the Far East, the US's explicit extended deterrence strategy of 'Pivot to Asia' is seen as an effort to curtail its rising power status. This will prove untenable in the long run unless China acts indefinitely with docility unmatched by any rising power in history or believes it is less entitled to a sphere of influence in the Asian region.[41] The age of complete domination by one single powerful country is over. It is time that the world starts accepting the reality of multiple powers co-existing with its own sphere of influence, or risk another global outbreak of conflict.

DETERRENCE'S PLACE IN TODAY'S WORLD

Modern day rivalry between powerful nations, shored by the increasing ability for military power projection has created a scenario of tense peace where potential flashpoints threaten to destabilise the status quo in areas like the South China Sea, Middle East and Eastern Europe. Where conflict has broken out, like in Ukraine, it is easy to point the finger at the current geopolitical and security context as the cause for failed deterrence. However, as we have examined in the later paragraphs, they simply set the stage. Failure of the big nations in the game of global power struggle to cope with reality and fall back on the fundamentals of deterrence are really the ones to shoulder the blame.

Dealing with Newer Security Threats Like Terrorism

The relative success of rehabilitation programmes has led some to believe the irrelevance of deterrence. However, the asymmetry of objectives in the war against terrorism renders such an argument moot. It takes just one successful terrorist strike for them to meet their objectives, whereas countries have to deny such attacks indefinitely for them to be successful. Therefore, it is always vital for some form of punitive or denial capability to exist as a deterrent against terrorism against high-value targets.

Moreover, the shift in the nature of security threats to one dominated by transnational terrorism and ideological warfare has rendered conventional deterrence policies, originally devised for structurally symmetric conflicts involving nations, somewhat impotent.

The strategies outlined above are also by no means a one size fit all solution that would immediately render deterrence relevant and effective against all conflicts. The constantly evolving security and geopolitical landscape implies that deterrence strategies would have to constantly keep up with the times as well. Despite all its shortcomings, deterrence still is highly relevant in today's context. Countries just have to revisit the fundamentals of deterrence that have served the world well for the past centuries and relearn the basics of applying deterrence theory in the modern world. It is not the time yet to pass off deterrence as an archaic museum relic.

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ENDNOTES

1. The SAF's mission statement is "to enhance Singapore's peace and security through deterrence and diplomacy, and should these fail, to secure a swift and decisive victory over the aggressor."

   One of the tents of the Israeli's Defence Force's (IDF) main doctrine is "to avoid war by political means and a deterrence posture"

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29. Only Afghanistan, Cuba, Nicaragua, North Korea, Syria and Venezuela recognize Crimea as a federal subject of Russia

30. The involvement of NATO as a supranational body, whose combined military strength of its member states is significant to that of a global military power, in the Ukranian conflict adds another dimension to the proxy conflict between the West and Russia.

31. The "Salami-slicing" tactic of eroding deterrence, involves the potential aggressor attempting to change the status quo by gradually shaving off the credibility and expectations of the defender and toeing the line of conflict threshold of the defender, such that gains against the defender can be made without triggering a massive response from it. Russia's limited war operation in Ukraine does not qualify as a full-scale war but yet are small steps in altering the status quo of geopolitics, which fall just short of the West's threshold for military intervention given their general aversion for escalation.

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34. These include the Charlie Hebdo Shootings on 7 January 2015 and the mass attacks in Paris on 13 November 2015 that killed about 130 people.

Most recently, the San Benardino Shootings on 7 January 2015 was carried out by radicals with links to ISIS and killed 14 people.

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MAN OF THE MACHINE

by LTA(NS) Chin Hui Han, Ms Annalyn Ng & Ms Sonya Chan

Abstract:

Technology has advanced significantly over the years, affecting the way wars are fought and threats dealt with. With the utilisation of technology in the modern military, soldiers may no longer have to risk their own lives out in the field, but to see action through the 'eyes' of a machine. However, the authors caution that while unmanned systems may be considered an important element for future warfare, this technology cannot be the panacea. To them, warfare is fundamentally a human endeavour, and therein lies the paradox: unmanned systems need men. While effective collaboration between the two parties would lower the involvement and loss of men in waging war, misuse could bring about more conflicts and war. This essay explores the seeming contradiction in three parts: unmanned systems as a pivotal capability in modern warfare, the pitfalls of taking the man out of unmanned systems, and how the Fourth Generation Singapore Armed Forces (SAF) can avoid these pitfalls to harness the power of unmanned systems. The authors conclude that while Singapore has adopted unmanned systems as a complement to the capabilities for her soldiers, it will be necessary to ensure that the introduction of unmanned systems is followed by comprehensive rules governing their usage, as well as adequate training to ensure that soldiers achieve true integration with their unmanned counterparts.

Keywords: Future Warfare; Unmanned Systems; Over-reliance; Force Multiplier; Misgovernance

> *"We have to diminish the idea that technology is going to change warfare. War is primarily a human endeavour."*
>
> *- Then-General James Mattis*
> *Commander, US Joint Forces Command*
> *and NATO Supreme Allied Commander, 2007*[1]

A GOOD KILL

On 7th October, 2001 in Afghanistan, in the dead of night, a MQ-1 Predator Unmanned Aerial Vehicle (UAV) fired a Hellfire missile onto a compound in pursuit of Mullah Muhammed Omar, the supreme commander of the Taliban. This was the first time a United States (US) drone had fired a weapon in combat, and it would mark the very first time a modern drone killed a human being.[2]

Fast forward to 2015, and drone strikes are increasingly prevalent in a global fight against insurgencies and terrorist factions. Already actively deployed in combat by four countries—the US, Israel, the United Kingdom (UK) and Pakistan—armed drones are rapidly gaining significant traction.[3] It has easily become the weapon of choice, allowing countries to take lethal action against the enemy from vast distances, and at low risk to friendly life.

In an ironic twist, however, these international drone programmes are also frequently blamed as the fundamental force for the genesis of new enemies. They engender open critique from both soldiers and academics alike—especially in the wake of drone attacks in civilian-heavy compounds.

MQ-1 Predator drone

So while unmanned systems are frequently touted as a cornerstone of future warfare, this technology cannot be the panacea. Warfare is fundamentally a human endeavour, and therein lies the paradox: unmanned systems need men. Effective collaboration between the two parties would lower the involvement and loss of men in waging war, but misuse could bring about the birth of more conflicts and war.

This essay will explore the seeming contradiction in three parts: 1) unmanned systems as a pivotal capability in modern warfare; 2) the pitfalls of taking the man out of unmanned systems; and 3) how the 4G Singapore Armed Forces (SAF) can avoid these pitfalls to harness the power of unmanned systems.

WARFARE IS A HUMAN ENDEAVOUR

While views amongst statesmen, soldiers, academics and the general populace might differ on its exact definition, the Greek historian Thucydides' delineation of war as 'the human thing' is widely accepted and reflected in intellectual discourse, military doctrine and the code of law.[4]

In *Leviathan*, an influential work on the structure of society and government, the philosopher Thomas Hobbes argues that without an external power to impose laws, the state of (human) nature would be one of imminent warfare. This position is supported by the Clausewitzian 'trinity' of emotion, chance, and reason—three dominant energies inherent to the conduct of war that have been hypothesised as extensions of the Heideggerian state of being human.[5]

This philosophical connection between man and warfare has long manifested in military doctrine. One of the first principles of war, espoused by militaries worldwide, is to destroy the enemy's will to fight. This is explicitly laid out in the US Armed Forces field manual, which states: 'The ultimate military purpose of war is the destruction of the enemy's armed forces and will to fight.'[6]

But it is important to remember that while warfare can be seen as a clash of either societies or of human will, it should not be attributed solely to violent tendencies. There is an emphasis on chivalry and protection for the weak and innocent, seen not only in the formalised laws for warfare in The Hague and Geneva conventions, but also evinced by prominent military men such as the distinguished General MacArthur, who wrote: 'The soldier, be he friend or foe, is charged with the protection of the weak and unarmed. It is the very essence and reason for his being.'[7]

Nobility in warfare is expected of civilised peoples, and while advanced weaponry is essential in battles, wars are ultimately won or lost by people.

THE GROWTH OF UNMANNED WARFARE

The benefits of unmanned systems are widely-publicised and well-recognised, and do not necessitate extensive reiteration. In the military context, they are typically employed in operations characterised by the 4Ds—dull, dangerous, dirty and deep. During World War II (WWII) and the Cold War, the Germans and Soviet Union had their respective remote-controlled

A US Navy Sailor with a PackBot

mines and tele-operated tanks, and in 1982, the Israelis deployed UAVs to spoof air defence radars in Lebanon, before commencing airstrikes by manned aircraft. Today, the US Amy deploys hundreds of Explosive-Ordnance Disposal (EOD) robots, known as PackBots, that work alongside EOD personnel to mitigate highly dangerous situations.

The form and function of unmanned systems confer many advantages over the human war fighter, in particular long endurance and persistence capabilities. But it is their ability to facilitate the entire sense-strike operation cycle, without risking friendly leg or limb, that truly differentiates it from other contemporary military capabilities—and paves the way for a fundamental shift in the nature of warfare.

So while drones have become a straightforward solution to the intractable problems of modern conflict, they have also been instrumental in lowering, if not eradicating, the bar to global warfare.

HOW UNMANNED SYSTEMS ARE CHANGING THE NATURE OF WARFARE

In *Human Warfare*, Christopher Coker wrote that developments in technology demonstrate the West's desire to humanise war, embrace modernity and reduce casualties.[8] In the same manner, unmanned technologies are an obvious solution to the political and public inability to reconcile with military casualties.

The easy adoption of unmanned systems is most obvious in its greatest proponent—the US. When Barack Obama was sworn in as President in 2009, the American drone war had then been confined to a single country, Pakistan, where 44 strikes over five years had left an estimated 400 people dead. Three years into his term, and the number of US drone strikes had soared to nearly 240, with the number of casualties more than quadrupled: the result of a growing American drone apparatus that now included dozens of secret facilities across the US and a constellation of clandestine bases in at least six countries globally.

Just as mercenaries were hired in the past, post-modern militaries will see dangerous fighting being 'outsourced' to robots. Removing the threat of direct personnel danger or loss of life would make it easier for the public to countenance military action; the consequent lowered political consequences would also mean governments can be less hesitant in using force rather than diplomacy to solve conflicts.[9]

Counterterrorism guidelines released by the Obama administration in May 2013 reflect changes in government outlook—essentially, lethal strikes can now be conducted by the US outside of 'an area of active hostilities,' if a target presented a 'continuing, imminent threat to US persons.'[10]

So while drones have become a straightforward solution to the intractable problems of modern conflict, they have also been instrumental in lowering, if not eradicating, the bar to global warfare.

THE PITFALLS OF UNMANNED WARFARE, FROM THE HUMAN PERSPECTIVE

Global outrage has often followed in the wake of drone attacks, especially when targeted at civilian-heavy compounds. In the fall of 2015, four former US Air Force personnel, with more than 20 years of combined experience operating military drones, would add to this controversial legacy by writing an impassioned open letter to Barack Obama warning of the faltering programme of targeted killings by unmanned aircraft, and its role as a major driving force and powerful recruitment tool for the Islamic State in Iraq and Syria (ISIS) and other terrorist groups.

This type of backlash is not unprecedented, with the US Guantanamo Bay Detention Centre a significant case in point. Established as a high-security prison that would house and prosecute dangerous persons, it has long been considered a salient propaganda symbol for international terrorist groups, used to incite dissent and breed empathy in local communities.

The use of unmanned systems must thus be deliberated and effected deftly, to ensure that the human aspect is never completely decoupled from unmanned warfare. There are three potential pitfalls otherwise:

1. Over dependency on unmanned systems in military operations;
2. Averse moral and psychological impact on own forces; and
3. Loss of moral high ground and the instigation of animosity.

Over-Dependency on Unmanned Systems in Military Operations

An oft-used refrain against technology over-reliance is the anecdote of the Millennium Challenge 2002 (MC02), a major war game exercise that was conducted by the US armed forces to test future military 'transformation' concepts such as network-centric warfare. During MC02, Blue forces adopted electronic warfare and networking capabilities to emulate modern war-fighting concepts that were expected to clinch victory. These, however, were dealt a crippling blow by the asymmetric strategy adopted by the Red aggressor forces, which leveraged antiquated tactics from WWII to evade Blue's surveillance, forcing a reset of the exercise on its second day.

An investigation into counterinsurgency wars, conducted by Lyall and Wilson in 2009, would reinforce this refrain. Comparing the performance of the US' light infantry 101st Airborne Division (101ABN) and the heavily-mechanised 4th Infantry Division (4ID) during their deployments in Iraq, the authors make a convincing argument that the increasing mechanisation of modern military forces contributes to an 'increased probability of state defeat.'[11]

To provide protection to soldiers, the 4ID had utilised armoured and vehicle platforms in conducting mounted patrols. These large vehicles would eventually fail to gather sufficient intelligence or establish a persistent security presence—but also intimidate and anger the local population by bullying their way

through traffic and causing collateral damage during firefights. In contrast, the 101ABN had its units living amongst the population and conducted foot patrols: its soldiers would build a deep understanding of the community and locale, and commanders were able to establish friendly, collaborative relationships with local leaders.

The 101ABN had been able to accurately target raids and separate insurgents from the rest of the civilian population, while the 4ID's operational style had fuelled rather than suppressed insurgencies. The results speak for themselves: the 4ID would see the highest rate of insurgent attacks of any division in the 2003-2004 time period, while the 101ABN saw only one-fifth of the Iraq-wide average, despite their adjacent areas of operation and lack of armoured protection for the 101ABN.[12]

Over-reliance on transformational technologies can thus become an Achilles heel in military strategy. This applies easily to unmanned systems, and military planners need to recognise that their use would not be universally effective. Despite the risks to personnel, and in spite of the fact that unmanned systems could technically substitute human involvement, some operations—such as establishing ties with the local population—require human soldiers for mission success. For these, over-dependency on unmanned systems would be detrimental to overall combat effectiveness.

Averse Moral and Psychological Impact on Own Forces

The highly-valued persistence and endurance of unmanned systems, and their ability to compress and execute the complete sense-strike kill chain, place great stress on their human operators. Operators not only need to work over long hours and frequent shift rotations in order to keep up with their mechanical counterparts, but also maintain sufficient focus and mental acuity to make split-second decisions for target prosecution.

In 2011, a study was co-authored by Wayne Chappelle, chief of aerospace psychology at the Air Force School of Aerospace Medicine at the Wright Patterson Air Force Base, on more than 1,400 Air Force personnel—including 864 drone operators—to identify areas of high stress within the Air Force's drone programme.[13] Chappelle found that 17 percent of operators for the armed Predator/Reaper drones, and 25 percent of operators for unarmed Global Hawk drones, showed signs of 'clinical distress', a condition that counts depression and anxiety amongst other debilitating symptoms that interfere with job performance and personal interactions. These statistics lie very close to the estimated 28 percent of US soldiers that are diagnosed with clinical distress after returning from deployment in Iraq.[14]

In addition, the responsibility of taking lethal action is likely to remain with the operators, given the unlikelihood of granting unmanned systems full autonomy in terminating human life. The psychological stress of warfare on soldiers is well-documented, but drone operators will face even greater challenges: unlike their peers on the ground, drone operators need to look through the 'eyes' of their mechanical counterparts to assess situations and respond quickly. The detached and isolated nature of their operations is likely to impact their decision-making, and could make it easier for them to take less account of their moral compasses.[15]

The ethical decision-making of a drone will only be as good as that of its operator, and the nature of their heavy duties will tax their mental resiliency, shift ethical mindsets, and add to their emotional exhaustion.[16]

Over-reliance on transformational technologies can thus become an Achilles heel in military strategy. This applies easily to unmanned systems, and military planners need to recognise that their use would not be universally effective.

Loss of Moral High Ground While Fostering Animosity

In 2012, the United Nations' Special Rapporteur on extrajudicial, summary or arbitrary executions, Chistof Heyns called on the Obama administration to justify its legal position in executing rather than capturing suspected terrorists.[17] This was a reaction to the growing number of airstrikes conducted by the US with drones, and a consequent increase in civilian casualties even in areas where it was unclear if armed conflicts were on-going.

The American killing of assumed terrorists by drone has been accused of being a failure in moral leadership, and a significant contributor to the US' loss of moral high ground. When operations are remotely conducted, war can no longer be truly just—one side will necessarily sustain more losses by virtue of the other party being safely shielded thousands of miles away. War is uncomfortably bloody and gruesome—but it should remain so, if only to remind society of how appalling and dreadful it is.

The US' counterterrorism policy has also been accused of a lack of transparency as to what truly constitutes a threat, and aiding the US government in escaping accountability and scrutiny in the death of innocent civilians. And just as states leverage the acts of ISIS and Al-Qaeda to raise empathy for their military action, militants are now using the US' drone operations to draw dissent and recruit supporters—and effectively so, as evidenced at the trial of Faisal Shahzad. A Pakistani-American who had sought to take revenge on the US' drone attacks in Pakistan by attempting to bomb a car in New York's crowded Times Square, Shahzad justified his actions during his guilty plea by telling the judge, 'When the drones hit, they don't see children.'[18]

UNMANNED SYSTEMS FOR THE 4G SAF

The SAF's current operational deployment of unmanned systems includes the UAVs and Unmanned Surface Vessels (USV) in overseas operations. As part of Operation Blue Ridge, the Searcher UAV and the Imagery Analysis Team were deployed in Afghanistan to support the International Security Assistance Force, providing coalition forces with timely imagery intelligence and support in counter improvised explosive device (IED) operations. The RSN's Protector USV has also been deployed in the North Arabian Gulf during RSS Resolution's three-month support of multinational reconstruction efforts in Iraq.

During his speech at the Committee of Supply Debate 2014, Minister for Defence, Dr Ng Eng Hen, laid out the vision for the SAF in the year 2030.[19] An integral part of that vision was the use of unmanned systems, which would substantially bolster the SAF's operations as well as allay demographic challenges posed by the nation's low birth rate and shrinking local population. To continue defending Singapore and her interests in the future, the SAF's use of unmanned systems in its operations is not a choice, but a practical necessity.

The SAF prides itself on its ability to leverage technology as a force multiplier, allowing it to punch far about its weight. For Singapore, unmanned systems are currently deployed to augment soldiers' capabilities, such as in the use of robotic platforms

in Chemical, Biological, Radiological and Explosive (CBRE) operations. In reaping the benefits of unmanned systems, however, the SAF needs to avoid the pitfalls of dehumanising warfare. The following measures are proposed, based on technology developments and psychology principles:

1. Effective man-unmanned teaming;
2. Training for psychological preparedness and resiliency; and
3. Humanising unmanned systems.

Effective Man-Unmanned Teaming

Future battlefield scenarios will be played out by dynamic teams comprising man and his unmanned systems. As the technology continues to mature, robots will be able to do more, and do it even faster and better—and the natural tendency would be to 'outsource' even more work to them. It is imperative, then, that the SAF guards against over-reliance on these capabilities, to ensure that soldiers remain operationally effective—with or without their unmanned counterparts.

When operations are remotely conducted, war can no longer be truly just—one side will necessarily sustain more losses by virtue of the other party being safely shielded thousands of miles away.

The Defense Advanced Research Projects Agency (DARPA) Robotics Challenge (DRC) 2015 saw teams remotely operating robots in a simulated hazardous environment. The teams had to build and operate the robots even when communications were degraded, rendering motion-level control by a human

A ScanEagle UAV on board a Missile Corvette (MCV).

Battle scenes in the Armour Gunnery and Manoeuvre Simulator

unfeasible.[20] This is a key exemplar on the emphasis accrued to robust man-unmanned teaming—besides developing robust communications technologies and giving more autonomy to the unmanned system, the SAF can further develop strength-based teaming through training and procedures. For example, exercises for the Army's Training and Evaluation Centre (ATEC) could include scenarios in which the unit's organic unmanned systems are taken offline, or operating in degraded performance, such as with damaged sensors or severe communication delays.

These common and realistic scenarios will remind soldiers of the need to maintain knowledge and competency for continued mission success, since circumstances could easily arise for which humans need to engage even in situations marked by the 4Ds. Soldiers will also learn to better appreciate their unmanned counterparts and their operational contributions, which would encourage them to take care of the robots, and ensure their sustainability on the battlefield.

True mission success will be the result of effective man-unmanned teaming, through which the human operator will be well-versed with the strengths and weaknesses of the unmanned system, cognisant of how to employ its capabilities to great effect, and maintain sufficient mastery to step up and complete the mission when his unmanned brethren falters.

Training for Psychological Preparedness and Resiliency

Simulators and 'serious games' will be key enablers for the SAF in training soldiers for mental resiliency and acuity. They will help to inculcate core values and leadership skills, and properly-designed tools would be instrumental in building critical skills and preparing soldiers for the psychological stress of unmanned warfare.[21]

The SAF already has *Decisive Combat*, a third-person shooting game for junior military leaders in which a player takes on the role of a Second Lieutenant to take down terrorists under different scenarios.[22] At various points, the player will be prompted to make critical decisions, such as whether to storm a room or radio for orders—building their critical thinking and analytical skills, as well as training them to make decisions quickly and accurately under stress. In addition, the SAF regularly uses simulators to conduct engaging, effective and efficient training for diverse scenarios, which are not feasible or practical in field training—these systems include the Leopard Driving and Training Simulator and Infantry Gunnery and Tactical Simulator (IGTS).[23]

In the future, games such as *Decisive Combat* can be played out within simulators for unmanned platforms, creating 'serious simulations' that exercise the extended work cycles and compressed decision loops associated with operating unmanned systems, and accustom soldiers to making decisions and assessment through the eyes of the unmanned platform. This will allow the SAF to hone not only the tactical and operational skills, but also sharpen critical decision skills and bolster the mental resilience required in operating unmanned systems.

Humanising Unmanned Warfare

The SAF's mission lays out Singapore's clear focus for prudency in action, with an emphasis on deterrence and diplomacy. As such, the SAF's use of unmanned systems will never create issues of moral high ground, as these capabilities should never be used for unsanctioned targeting outside of hot war. A clear line should be drawn: lethal applications should continue to maintain a human in the loop, and efforts must continue in maintaining minimal inconveniences to non-combatants in the area of operations—which will foster military-civilian relations, and prevent any animosity from the local populace.

To complement these efforts, information operations can be employed to deliver and reinforce this stance through mass media and social media networks, and the unmanned platform themselves can be used in the campaign. For example, the Israel Defense Forces (IDF) uses tactical UAV videos of military operations to debunk deceptions and false information created by its opponents.[24]

To further reinforce the point that unmanned systems are meant to augment the SAF capabilities and will not serve as a faceless killing machine, emphasis can be given to 'humanising' the unmanned platforms. US military troops that depended on autonomous robots for dangerous but crucial jobs, such as mine-sweeping, demonstrated emotional bonds with their robotic comrades during extended periods out in the war zone: robots were given names, and bestowed with military honours and funerals. By extending the same treatment to robots as to humans, soldiers will grow to view robots as comrades and allies, and general society can learn to see these unmanned systems as crucial tools for human operations, rather than disconnected, marauding agencies of the military.

THE PARADOX OF UNMANNED WARFARE

The use of unmanned systems is not a cure-all panacea. The current deployment of drones worldwide poses a cautionary tale to over-reliance and misgovernance of these systems, and increased use would also expose both military operations and moral mindsets to new threats. A fine line exists between remedy and overdose—and misuse has the potential to erode our forces and communities from the inside out. Singapore has adopted unmanned systems as a complement to the capabilities for her soldiers—and it will be necessary to ensure that the introduction of unmanned systems is followed by comprehensive rules governing their usage, as well as adequate training to ensure that soldiers achieve true integration with their unmanned counterparts.

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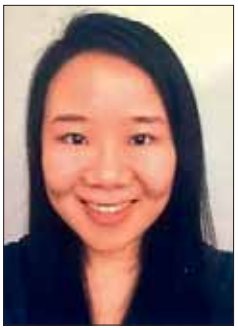

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ORGANISATIONAL DESIGN: THE MILITARY PERSPECTIVE

by **LTC(NS) Halmie Bin Hussein Mattar**

Abstract:

In this essay, the author examines design structures within commercial organisations as well as military organisations. The concept of keeping lean allows commercial organisations to be effective and efficient in delivering their business strategy and plans. The military however, according to the author is characterised by a monopolistic industry, that is not affected by profit or losses. As the evolving political, economic and social environment is pushing the military to adopt lean concepts, it faces adverse questions on its efficiency and effectiveness. The author highlights that as the military adopts organisational design models of keeping lean, through delayering its structures and outsourcing its functions, it needs to appreciate the roots of its traditional design and the implication of adopting any new concept. The principle of keeping lean with delayering and outsourcing of activities is not totally ineffective in the military organisation. The author believes that the concept has its merits and military can exploit the concept while comprehending its limits and appreciating its roots. However, the author cautions that while it is efficient to delayer its structures and outsource some of its activities, for example training, the military must be certain that its core competencies of developing its leaders and imbuing its soldiers with its values and norms are not eroded. The author stresses that while the military continues to outsource its military tasks, it must constantly anchor on its core competencies. It must never outsource its core competencies or any tasks linked to its core competencies. There should not be a situation when the military is called into action and it is not able to deliver mission success.

Keywords: Redesign; Efficient; Core Competency; Cost; Outsource

INTRODUCTION

Organisations develop strategies so that they can plan for their long term growth and development. This direction is to give them an edge over their competitors in the operating environment. Strategy implementation is defined as the process through which a chosen strategy is put into action. It involves the design and management of systems to attain the optimal integration of people, structure and processes in achieving organisational objectives.

Michael Porter, in *What is Strategy?* highlighted that long term fixed strategies are no longer valid in the new volatile environment and rejected the idea of static strategy, in this dynamic environment and changing technology.[1] Charles Handy in *The Age of Unreason* argued that the environmental changes faced by organisations now are different than that experienced in the past.[2] The environmental changes are discontinuous and not part of a pattern.[3] Therefore, organisations can no longer make predictions about their future direction and growth.

With such dynamism, how can organisations have an edge over their competitors? The only way is to design ones' structures, processes and systems to adapt to these changes before the competitors can. David Nadler and Michael Tushman in their work '*Competing By Design*' proposed that the only real source of competitive strategy left in this volatile environment is organisation design.[4] The interesting notion is: how would such organisation design apply to the military, a unique entity that exemplifies its existence through a power of its example and an example of its power.

EVOLUTION IN ORGANISATION DESIGN

The Oxford dictionary defines an organisation as an 'organised group of people with a particular purpose.'[5] The goal of organisation design is to successfully enable this group of people to achieve the task in an effective and efficient manner.

The push for the military to implement organisation design and employ commercial best practices comes as society now compares and contrasts public institutions with commercial entities.

The military existed before organisation design studies even began. Much was learned from the military in terms of organisational designs in the early years. In fact, during the time of Frederick the Great of Prussia, the prototype of mechanistic organisation had already emerged.[6] In the primitive years of organisation design studies, commercial companies adopted military organisation designs. More evidently, in the industrial age, commercial organisations embrace various design architecture used by the military. Commercial organisation structure began to adopt military structures.

As organisations grew, it began adding vertical layers and horizontal divisions. Both commercial and military organisations expanded in this way. The bigger you are, the more resources you have to dominate your competitors. The strength of the organisation is in its numbers and its own self sufficient resources. However, this same mammoth design is impeding organisations from being nimble and adaptive to the constantly changing environment.

In the 1980s, these huge organisations began to declutter and delayer their corporation.[7] In the 1990s, these organisations are judged on their ability to identify, cultivate and exploit core competencies that make growth possible.[8] At the start of the 20th

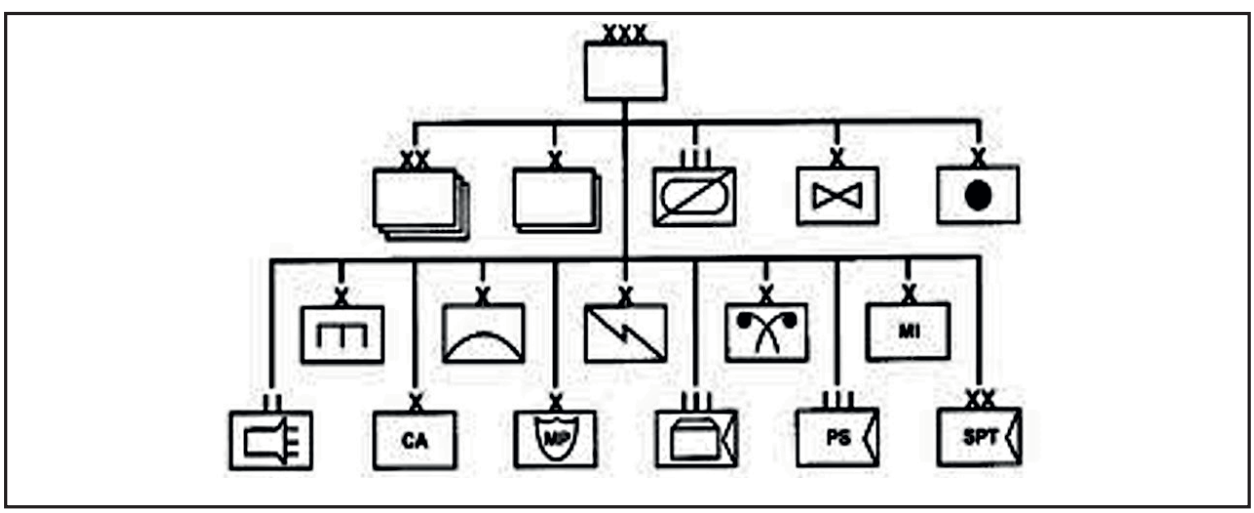

Figure 1: Typical Military Structure.[9]

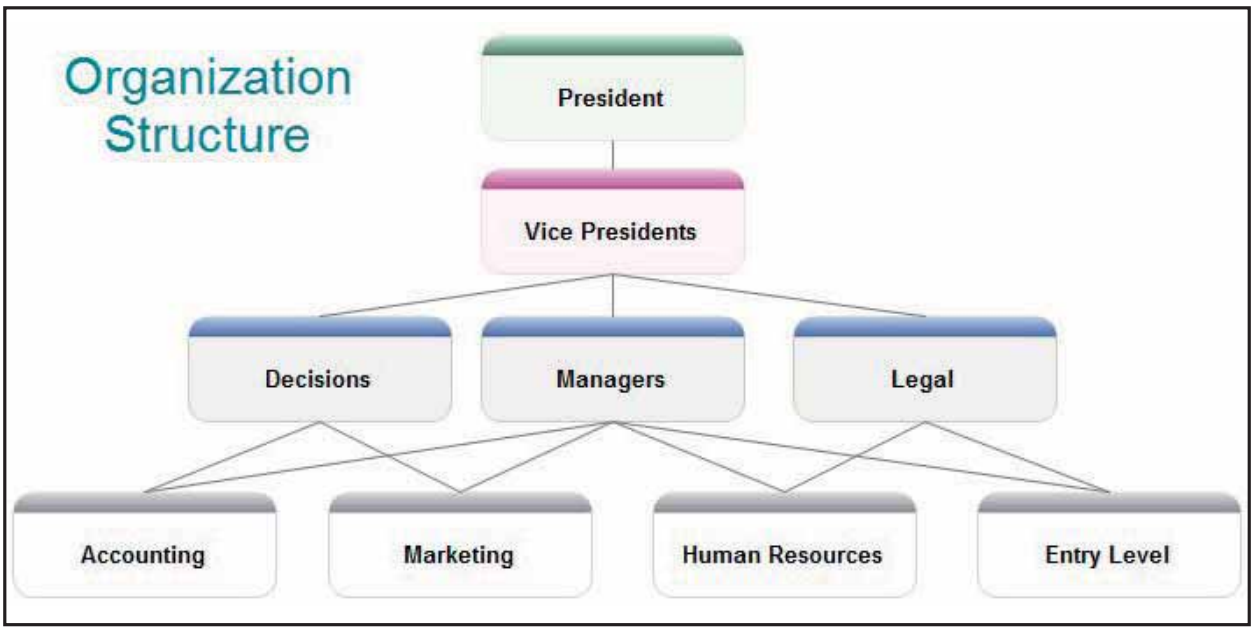

Figure 2: Common Commercial Organisation Structures.[10]

century, lean organisation design emerged with the delayering of structures and the outsourcing of non-core activities.

> *"It is not the strongest of the species that survive, nor the most intelligent, but the one most responsive to change."*
>
> *- Charles Darwin*[11]

WHY IS THE MILITARY FOLLOWING?

In analysing the defence industry, there is only one army, navy and air force, thus exemplifying the monopolistic industry. Hence, military leaders are not entrepreneurs, who are rewarded with profits and penalised for losses.[12] Accentuating this monopolism is the fact that military output could never be measured explicitly in monetary quantification. More importantly, unlike commercial entities, military units can neither be taken-over nor made bankrupt.[13] Therefore, why is there a need for the military to adopt commercial organisational design practices?

The basis of all analysis of organisation design begins with the external environment. While the military maintains its autonomy, it also reflects the societal trends that are emerging, evolving and nascent.[14] Defence is a major user of the country's scarce resources.[15] These scarce resources are now being questioned openly and actively, in recent years, as the society becomes more open and vocal. Therefore, Hartley advocates that the military itself cannot avoid being questioned about the efficiency with which it uses society's scarce resources.[16] The push for the military to implement organisation design and employ commercial best practices comes as society now compares and contrasts public institutions with commercial entities. The ideas of economic rationalism have also forced the military to 'do more with less' by increasing operational efficiencies, reducing administration and logistical overheads, and increasing the accountability to the government.[17] Therefore, the military cannot achieve these demands with the gigantic organisation structure that existed before.

Advocates of organisation redesign have highlighted that the disadvantage of this design structure is that it emphasises resource management, to the detriment of the value of human capital and social capital.

ORGANISATION DESIGN

Organisation design is the science of developing peak effectiveness and optimal efficiency in an organisation to execute its strategy or task. Effectiveness refers to an absolute level of outcome attainment.[18] Efficiency refers to an input-output ratio or comparison.[19] The essence of organisation design is to maintain the balance of peak effectiveness and optimal efficiency as it delivers its task and purpose. For a fruitful defence discourse, the concepts of effectiveness and efficiency should be further refined. Effectiveness-wise, since the outcome is not quantifiable, the 'absoluteness level' thus lies on a simple yet critical benchmark of deterrence and response. Other than a regretful proof through conflicts, it can be safely assumed that the desired level of immeasurable output had been met effectively in the contemporary peaceful climate. As for efficiency, it is either a question of doing more with same resources or maintaining status with fewer resources. With peace as an intangible measurement, the idea of 'doing more' would seemed forlorn. As such, the organisational design concept of the military can be surmised as: How do we maintain the current climate of peace with fewer resources?

Katz & Kahn proposed that the best performing organisations are both effective and efficient.[20] However, Mahoney counter proposed that there may be trade-offs between the two.[21] There are no conflicts to these two proposals, with the conduit of harmony residing in the idea of extent: the extent of effectiveness and efficiency within a concoction of desired equilibrium. Therefore, the intent is to be able to identify at which state of the equilibrium the military will tilt its effectiveness as it aims to achieve

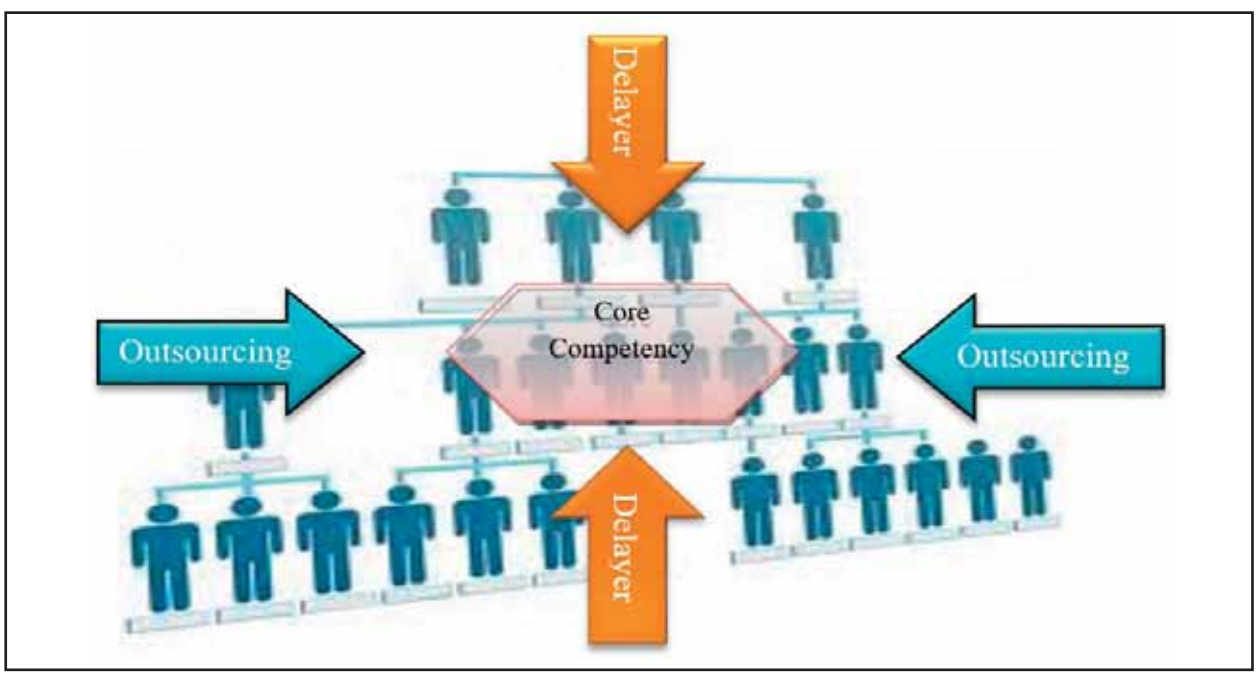

Figure 3: Core Competency Relationship with Outsourcing and Delayering.[22]

efficiency through the adaptation of contemporary commercial organisation designs. Traditional military structures and the organisation of mammoth scale was designed for the military to be an effective military tool. While the military tries to scale down in order to be more efficient, it must not diminish its effectiveness.

> *"There is nothing so useless as doing efficiently, that which should not be done at all."*
>
> *- Peter Drucker*[23]

In order to shrink vertically, organisation design approach proposes delayering the levels in the organisation. These lesser levels will facilitate a more effective and efficient vertical linkages, hence optimising the flow of information and decision making. In order to shrink horizontally, outsourcing of non-core business units, functions or divisions became the solutions. In any organisation design, to keep it lean, one must be able to identify its core competencies. Subsequently, structures and processes are delayered down to its core competencies. This hinges on the correct identification of core competency and maintaining the right equilibrium of outsourcing non-core activities.

C. K. Prahalad, and Gary, in '*The Core Competence of the Corporation*', proposed that core competency is defined as the hidden, deeply rooted and not easily imitated competencies.[24] These core competencies are a business underlying source of strength and success.[25] Organisations, such as Nike, harness their core competency (namely Design and Marketing) and outsourced every other task such as manufacturing and distributing. This allows them to be nimble with the fast changing trends. Itami titled it as Mobilising Invisible Assets.[26] Itami's invisible assets, such as technological know-how is equated to a firm's core competencies.[27] The very essence of this definition creates difficulty in identifying accurately organisation core competencies.

MILITARY CORE COMPETENCY

Core competency is a business term that has found its way into the military's lexicon.[28] Based on the business related definitions, core competencies are unique, hard to replicate, and enduring attributes. Hence, attributes, not product, of the military can be defined as unique and hard to replicate.

Qiao Liang and Wang Xiangsui in '*Unrestricted Warfare*' proposed that warfare could evolve into war beyond limits.[29] John O'Neill and Fergus O'Brien highlighted that the definition of the national tasks changes over time as governments evolve their ideas for employing the military.[30] With new challenges in the environment, the employment of the military continues to expand beyond conventional and traditional means. New concepts of Three Block War and full spectrum operations provide a glimpse into the vast utilisation of the military from hot war to peacetime operations. With such vast employment and utilisation of the military, can the military core competency be defined as clearly as commercial organisations?

Lieutenant Colonel Frederick S. Rudesheim highlighted that it is important to draw the distinction between the nature and conduct of war.[31] He argued that the nature of 21st century warfare is essentially unchanged from warfare throughout recorded history.[32] Hence it can be proposed that if the nature of war has not changed, the military core competency has not changed. The US FM 1's proposition that the core competency of the military is 'The ability to close with and destroy the enemy forces, occupy his

territory and control his population, removes his will to resist' would therefore remained as the first core competency of the military.[33] This core competency is not just a product but the strength that the military organisation has to execute the task, which cannot be easily replicated or duplicated by private organisations.

The development of adaptive, mentally agile leaders is another military core competency proposed.[34] The monopolistic nature of the military domain means that key appointment holders need to be groomed from within its fraternity. There are neither options nor candidates for hiring and transferring key executives. The Chief Executive Officer (CEO) of a big enterprise may be able to helm another big banking group, but for the same CEO to command a fighting force would be a totally different juggernaut.

> *"Wars may be fought with weapons, but they are won by men."*
>
> *- General George Patton[35]*

Therefore, the military should adopt and maintain as its core competencies: (1) Developing adaptive, mentally agile leaders; and (2) Closing with and destroying the enemy. These two competencies encapsulate the two principle and operational tasks of the military. For the purpose of studying the concept of delayering and outsourcing in the military, these two core competencies proposed will be used as a basis for analysis.

IMPLICATIONS OF DELAYERING FOR THE MILITARY

Traditional organisation design was based on a task approach design. Advocates of organisation redesign have highlighted that the disadvantage of this design structure is that it emphasises resource management, to the detriment of the value of human capital and social capital.[36] Paul Dumai, in '*The Role of Organisational Design in 21st Century Organisations*' highlights that the traditional sources of competitive advantage, such as products, technology, markets and production processes, are now considered obsolete.[37] The only advantage in this era is the speed and ability to transform strategy to reality.

One needs to appreciate that organisational design is not simply about structures and the resulting organisational charts. It is about synergising the relationships between people, work, formal structures and informal practices to get the task done effectively and efficiently.[38] Therefore, organisational design tends to also drive the decision maker and the processes on how those decisions are made.

The delayering concept works by cutting down bureaucracy such that decisions cycles can be made faster, so that the organisation can beat the competitors to the market. Every level is empowered and is engaged to make decisions and drive the organisation machinery. No longer are decisions hierarchical, nor processes and implementations stove piped. One proposal is that there will be changes in the role of the leaders as they become less decision makers and more decision shapers.[39]

The original form of a bureaucratic organisation design is to shape a rationally oriented organisation. One that is largely governed by factors which can be predicted and controlled.[40] For a military organisation, such prediction and control over the movements of their own troops is a matter of life and death.[41] The ability to command and control their own unit is related to the effectiveness of the unit in executing its task. In the *Fog of War,* the units who are able to administer control with precision and accuracy, will deliver mission success for military operations.[42]

Hence, the professional military men consider the bureaucratic model as the necessary setting for the successful conduct of operations.[43]

A second factor for consideration is secrecy. Secrecy has been described as an inherent characteristic of bureaucratic organisations.[44] The control of information is part and parcel of the military organisation design. Traditionalists have argued that this structuring of information is an integral part of military discipline.[45] Therefore, the channels of military information thus mirror the chain of command.[46]

The military edge in warfare is intelligence and secrecy. Napoleon Bonaparte once said "A spy in the right place is worth 20,000 soldiers on the battlefield."[47] The risk of breaking this traditionalist structure can have a profound effect in the way the military operates in the battlefield. Unlike commercial entities, the disclosure of military secrets affects not only the military but the country and politics as a whole. Thus, one can also argue that the armed forces have been accepted as an instance of bureaucratic organisation.[48] The general public regards and accepts the military as such. Society as a whole, while demanding for openness in the military, also understands the implications of the need for secrecy.

> *"War is ninety percent information."*
>
> *- Napoleon Bonaparte*[49]

Lastly, the culture of the traditional institution is essential for sovereign transactions institutions such as the military. The low powered incentives, characteristic of public bureaucracy, deter employees from being non-compliant and adventurous.[50] While, organisation wants to be open, there is a limit to it. High-powered incentives introduced in organisations can place the fidelity of the system at risk.[51] Critiques of the latest US banking crisis in 2008 would greatly agree to this. "Financial crises are caused by a mix of recklessness and risk-taking in the system," said US Treasury Secretary Timothy Geithner.[52]

OUTSOURCING IMPLICATIONS FOR THE MILITARY

Outsourcing involves a choice between undertaking activities 'in-house' or 'buying-in' from external markets.[53] What is the best mix of activities undertaken inside the organisation and which activities should be bought in? The general rule is that all core competencies are to be made and non-core competencies tasks are to be outsourced (bought).

There is an exertion by society for military to balance 'socially-desirable' level of 'output' and the 'appropriate' level of defence spending. Hence, environmental factors such as sensitive political and diplomatic considerations have led the military to outsource military functions.[54] Williamson identifies three key characteristics of transactions that affect efficiency of resources, namely uncertainty, asset specificity and frequency.[55]

Firstly, it is costly to recruit, train and retain military personnel.[56] The high salaries of military personnel makes outsourcing to commercial companies more attractive.

Secondly, producing a force internally, and maintaining it over time, is very costly for any country.[57] The opportunity cost of tying up this capital and manpower is lost economic output.[58] Most of the time, forces train, and weapons and equipment are in place but idle, waiting for contingencies.[59] The idea of being able to hire these forces only

when necessary reduced the costs of upkeeping the military. As society becomes more vocal and demands transparency, the subject of defence spending has been increasingly questioned.

The third factor is the low-powered incentive for internal employees.[60] The characteristics of low powered incentive creates inefficiency in the system. However, commercial organisations driven by costs and profits will be able to deliver the same outcomes in a more efficient manner.

Surprisingly, the concept of outsourcing could have originated from the military itself. The recorded history of outsourcing (namely mercenaries) goes back to ancient Greece and Rome.[61] In the middle ages, English kings hired the forces of various lords to fight foreign wars.[62] In the 14th century, Italian city-states hired professional companies of soldiers under contracts to provide specific resources for military services.[63]

In the late 1980s, private companies began to play a variety of roles like combat, direct combat support and general staff services. For budgetary reasons, the military continued to outsource more and more of the activities they were doing themselves.[64] Military outsourcing definitions includes contracting out, contractorisation and privatisation. However, in whatever shapes or forms of outsourcing, there are implications for the military.

Firstly, private military service contractors view military activities as a purely commercial enterprise.[65] Efficiency criteria can overshadow the construct of the military organisation which operates based on values and norms. The military does not view time as input and output, but a process in which values and norms are inculcated. This is the difference between effectiveness and efficiency. While its design may look inefficient, its intrinsic value inculcation processes forms the bedrock of the military organisation's processes and systems.

Secondly, an army must represent a self-sufficient system—one containing within itself the necessary means for attaining its objectives.[66] A military is designed and built to have its own resources to execute any tasks assigned to it. As it continues to outsource the various activities and elements, the military may lose its ability to execute its tasks when called upon by the country. The tunnelled vision of attaining high efficiency, can one day diminish the organisation effectiveness of achieving its task.

An outsourced contractor may not try to expeditiously achieve the objective.[67] Singer highlighted that commercial firms may avoid risks that potentially endanger their own assets.[68] Therefore, such private contractors will not execute operations in an effective manner. The military on the other hand, does not measure operations and tasks in dollars and cents, but in terms of delivering mission success whenever called upon.

It is about synergising the relationships between people, work, formal structures and informal practices to get the task done effectively and efficiently.

Advocates of outsourcing highlights that internal production by the military themselves involves its own set of inefficiencies, characterised by low-powered incentive.[69] However, private firms can also be on the other end of the spectrum. Therefore, operating in this model can cross the line between 'Doing the right things' to just 'Doing it right'. This can have major implications when lives are involved.

Next, the lack of accountability is one of the most often voiced objections to the increasing outsourcing of military tasks. Should the operations go wrong, private contractors may not want to shoulder full responsibilities. In October 2007, prompted by deadly shootings in Baghdad by armed guards working for Blackwater, based in the United States (US), the US House of Congress voted overwhelmingly to place all private contractors under the jurisdiction of the US courts.

Public institutions may have low-powered efficiency incentives but they are good on loyalty and trust. The private contractor can be presumed to have no loyalty to the state and its leadership.[70] Therefore, the private contractor may be non-compliant with the president's executive order.[71] These private contractors that manage the outsourced functions can threaten to walk away from the contract. When this happens, the military or even the country will not have any tool to deal with its threat.

On top of such issues such as loyalty and trust, there is also reputation.[72] One of the country's tools in the international relations arena is its military. Heads of states and societies, as a whole, need to be confident in the capabilities of their military. This is crucial in a defence arena, where the military is the proxy of the country's will and abilities. An outsourced private firm may not be able to represent the military in a manner that garners credibility and reputation. In a game of brinksmanship and volatility, the military must and should be seen as an effective tool.

CONCLUSION

The military must represent a self-sufficient system, one containing within itself the necessary means for determining and attaining its objectives.[73] This is a key and crucial idea that determines the limit of outsourcing concept in the military. The military must have full operational command over its resources with unquestionable loyalty and trust for it to utilise them.

Combat roles and combat support roles that are outsourced must ensure that the core competencies of the military are not degraded or taken away. At all times, the core competencies to execute a task must be at the discretion of the military organisation. Administrative roles such as logistics, human resources and training can continue to be an area for outsourcing. However, an important part of the training is to imbue the trainees with loyalty to the state and a collective rationality of purpose.[74] While it is efficient to outsource training, the military must make sure that its core competencies of developing its leaders and imbuing its people with values and norms do not degrade. These intrinsic factors are hard to quantify and manage when it comes to dollars and cents.

The concept of keeping itself lean with delayering and outsourcing of activities is not totally useless to the military organisation. It has its merits and the military can exploit the concept while comprehending its limits and appreciating its roots. However, the military itself must understand its history and tradition in order for it to understand its suitability.

While the military continues to outsource its military tasks, it must constantly anchor on its core competencies. It must never outsource its core competencies or any tasks linked to its core competencies. There should not be a day where the military is called into action and it is not able to deliver mission success. Society will continue to exert pressure on military organisations to run like commercial organisation. However, the military must be clear of what it can adopt and what will degrade its ability to execute its tasks. Unlike commercial organisations, the military is designed to operate in war, that we hope will never come.

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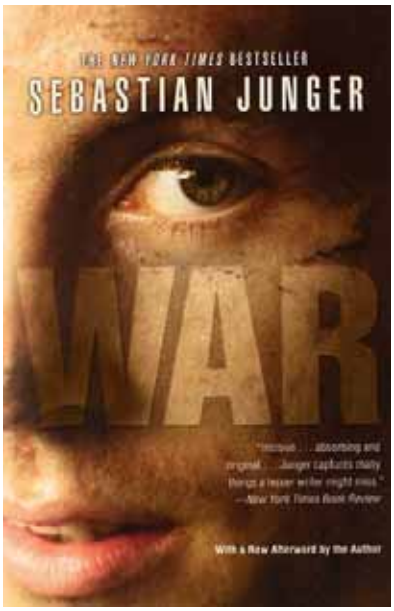
Book Review



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By **Oliver Cheok**

INTRODUCTION

The physics in the Korengal Valley is unforgiving—it is made such that an American soldier can see a bullet get fired, yet not have enough time to evade it.[1] An area of about 10 by 1.5 kilometres near the Afghanistan-Pakistan border, Korengal Valley is likely, per square mile, where most American soldiers have been killed, totalling a whopping 42.[2] A region known for its rocky mountains and high visibility, the valley is the last place where anyone would station a military outpost due to its lack of tactical advantages.

Yet, that is exactly what the United States (US) government did. *War* by Sebastian Junger follows Platoon 2 of Battle Company, 173rd Airborne Brigade, stationed at the outpost. Written first-hand over five one-month attachments to the platoon between 2007 and 2008, Junger gets as close to the action as possible, and offers the reader insights into the realities of fighting in a war, and what drives us to it.[3]

KORENGAL VALLEY

Located just beneath the ridges of the Kunar Province, about 25 miles from the border with Pakistan, the outpost was stationed to prevent Taliban fighters trying to pass through it to fight in other parts of the country.[4] By preventing support from coming from beyond Afghanistan's borders, the fight against presiding insurgents in Afghanistan could be helped. However, the military outpost quickly became the main attraction. Insurgents were drawn to the area, targeting the American troops themselves.

As such, it is no surprise that while it was commissioned, soldiers in the outpost saw a

lot of action, with barely more than 100 soldiers experiencing almost 20% of all conflicts in the entire country. It is not without reason that five Medals of Honour were earned in the valley or its immediate vicinity.[5] Soldiers informally referred to it as the 'Valley of Death'. Junger describes it aptly as such: "It's a miraculous kind of antiparadise up here: heat and dust and tarantulas and flies and no women and no running water and no cooked food and nothing to do but kill and wait."[6]

Nothing to do but kill and wait. Junger thus launches us to the main crux of his book—war, and why we do it.

BAND OF BROTHERS

Most of us are able to recognise that in spite of our military assets, there are instances where troops must be deployed; some terrains simply do not allow for any alternative. The Korengal Valley is one such instance. Due to the steep terrain, high elevation and thick forestry, the usefulness of said assets is limited. Precision artillery, unmanned aerial vehicles, stealth bombers, gunships—they all have their uses, but sadly not here.[7] It is for places like Korengal Valley that the 'boots-on-the-ground' infantry was made for.

Band of Brothers is a phrase many of us have heard before, if only by the eponymous Home Box Office (HBO) pay television series. Yet it has a deep meaning that few of us have bothered to divulge. The three words carry enormous weight, capturing so aptly the brotherhood and love each soldier has for his fellow comrade. In his gripping first-person account, Junger truly sums up this phenomenon, citing it as one of the main reasons men go to war.

As Junger so pertinently puts it: 'The Army might screw you and your girlfriend might dump you and the enemy might kill you, but the shared commitment to safeguard one another's lives is unnegotiable and only deepens with time.'[8]

Indeed, one characteristic that is prevalent in all the stories written by Junger is the sense of unity among the soldiers. He espouses that no man, and especially no soldier, is an island. The sense of camaraderie between fellow soldiers not only drives them to protect one another, but is also a major motivation for choosing to enlist in the armed forces in the first place. Soldiers often choose a career in uniformed service in search of a family, or tribe, where they can feel a sense of belonging.

In the book, Junger describes a ragtag group of individuals from far-ranging backgrounds in the platoon. From the rich kid Ross Murphy to the ex-drug dealer Sterling Jones, the people mentioned in the book cover the entire spectrum of social class. Yet, despite all their differences, each of them would willingly take a bullet for another. This begs the question of why. What is it that causes such selfless behaviour and creates such strong loyalty?

In all military operations, there is a 'choreography' that each man must adhere to; a set of groupings and tasks which every soldier must follow in order to achieve order and mission success in a violently chaotic setting. The battlefield is one place where circumstances can change in the blink of an eye and nothing can be relied upon or taken for granted. Instead, the only thing that one can be sure of is that his fellow soldiers have his back. Junger says that this choreography requires that each man makes decisions based not on what's best for him, but on what's best for the group: 'If everyone does that, most of the group survives. If no one does,

most of the group dies. That, in essence, is combat.'[9]

The common understanding among comrades that has put their lives in one another's hands creates a sense of duty and familial trust. To trust another with one's life is a difficult thing to do; the level of trust that requires is phenomenal. However, it is made easier by the knowledge that he has entrusted you with his as well. This, Junger says, is what marks the brotherhood.

TWENTY MINUTES OF LIVING

Nonetheless, while Junger lists this brotherhood and sense of identity as the main reason why one would voluntarily enlist, he remains objective and lists other reasons why a soldier may choose to fight. One major factor in the decision to go to war is the allure of action. He takes great pains to distinguish this from barbarianism and the thirst for blood, however. The thrill of the fight comes not so much from deriving pleasure in killing others but in feeling one's blood pumping and levels of adrenaline rising. This adrenaline, Junger argues, is addictive.

As he put it: 'In some ways, twenty minutes of combat is more life than you could scrape together in a lifetime of doing something else. Combat isn't where you might die—though that does happen—it's where you find out whether you get to keep on living."[10]

Junger compares the excitement of combat with the mundanity of civilian life. In civilian life, achieving a sense of accomplishment is a cumbersome task that takes tedious effort. The humdrum of civilian life often becomes a monotonous drone and rewards are disproportionate to the effort spent. In contrast, the immediacy and effective action that the battlefield offers makes for a much more appealing narrative.

To illustrate his point, Junger provides the example of Staff Sergeant Giunta, who was awarded the Medal of Honour in 2010. Staff Sergeant Giunta and his platoon had just finished a day-long shift overlooking the valley below and were on their way back to their outposts. Barely 50 metres after leaving their station, they were ambushed by a force of around 15 heavily-armed insurgents. Staff Sergeant Giunta described it as such: 'There were more bullets in the air than stars in the sky.'[11]

Upon seeing one of his men take a bullet to the helmet, Staff Sergeant Giunta selflessly ran through the barrage of bullets to help him to cover. In the process of doing so, Staff Sergeant Giunta was struck with a bullet, though thankfully his protective vest saved him. Staff Sergeant Giunta proceeded to lead a counterattack against the insurgents, and for his gallantry was awarded the Medal of Honour by then-President Barrack Obama.[12]

In a firefight, lasting no longer than twenty minutes, one could risk his life to save the lives of his fellow men and be considered a hero for his noble and selfless deed. One could even find himself craving the opportunity to prove his loyalty and bravery. Junger goes so far as to say that 'almost every man [in Korengal] secretly hoped the enemy would make a serious try at overrunning the place before the deployment came to an end.'[13]

This is by no means meant to detract from the immense courage required for one to put his life on the line to save another. Rather, it is meant to explain why one would choose to do so. It should also be considered a testament to the brotherhood among soldiers, as while an attack was 'everyone's worst nightmare', it was also 'the thing they hoped for most, some demonstration of the bond and

fighting ability of the men'.[14] Oftentimes, soldiers such as the ones posted in the Korengal Valley chose to be there, not to serve a higher calling such as duty to country, but to defend their fellow soldier.

Junger puts it as such: 'Collective defence can be so compelling—so addictive, in fact—that eventually it becomes the rationale for why the group exists in the first place.'[15]

COURAGE IS LOVE

We hear stories of immense courage and selflessness often from the battlefield. And for every time that we hear of a particularly courageous act of valour in which a soldier risks his life to save a comrade, there are countless more that we do not hear about. In many war-torn areas, putting oneself in danger for another's safety is a daily occurrence. There must therefore be some intrinsic reason explaining why bravery is so abundant in these men and woman.

Junger provides, with substantiation from historical studies, that soldiers have greater levels of courage when they have a sense of control or choice in their own fate.[16] In other words, when a soldier voluntarily chooses to fight, he is less likely to be overcome by debilitating or crippling fear, being more likely to act courageously. This is even the case when quantitatively speaking, levels of danger are high. This may in part be due to a sense of ownership and purpose that they have in choosing to serve. Their reasons for making that decision, whatever they may be, help motivate them through difficult times.

This love, or courage, goes a long way towards showing why so many uniformed men around the world routinely put their lives in the hands of their peers, and conversely ask them to put their lives in their hands. This is supported by the perhaps-surprising study that Post-Traumatic Stress Disorder (PTSD) usually arises from witnessing injury or death of others rather than from a soldier sustaining an injury himself. Soldiers would rather befall serious injury themselves rather than see it happen to another. It is with these examples that Junger equates courage with love, as 'neither could exist without the other, and [to a soldier] they were just different ways of saying the same thing.'[17]

CONCLUSION

By all definitions, Junger has truly created a masterpiece in *War*. Densely-packed with riveting first-hand accounts and insightful revelations about the human psyche, *War* is truly Junger's magnum opus. Ambitiously named, the title proclaims the ability of the book to summarise the multifaceted and incredibly nuanced topic of war, the military, and the soldier. In most aspects, *War* lives up to this standard. While Junger does not tackle the socio-economic or political motivations behind war, he does lay bare its most inherent truths.

Nonetheless, readers who were hoping to gain a broader perspective of war on a macro-scale and learn more about the international intricacies of military conflicts will not find it here. *War* by Junger is many things, but it is not a be-all-end-all reference guide to war in the larger context. However, I would suggest to these readers to use *War* as a supplement in order to appreciate warfare at a micro perspective and in so doing gain a more holistic understanding of the subject matter.

I would recommend this book to all, from the military history buff to the novice, hoping to

learn more about combat and why countless people pursue it as a career. Junger addresses war at a primal level, explaining the fundamental reasons why we fight. The insights expressed within *War* are timeless and will ring true for generations to come. Thousands of men and women live day and night on our walls to protect us from what lies beyond. We owe it to them to understand why.

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Curtis E. LeMay (1906-1990)

by **David Ting**

INTRODUCTION

Curtis E. LeMay is a retired four-star general in the United States Air Force (USAF) who served from 1929 to 1965. He played an important role especially in World War II (WWII) and the Cold War. He was nicknamed LeMay, the 'Big Cigar' as he is often known for clamping a cigar in between his teeth.[1]

EARLY LIFE

Curtis Emerson LeMay, also known as Curtis E. LeMay was born on 15th November, 1906, in Columbus, Ohio. LeMay's father, Erving Edwin LeMay, was an ironworker and general handyman and his mother, Arizona Dove Carpenter-LeMay, was a housewife.[2] Raised in Columbus, Ohio, LeMay attended Ohio State University where he studied civil engineering. After graduating in 1928, he enlisted in the United States Army Air Corps (USAAC) as a flying cadet and received his training at Kelly Field, Texas.[3] He was commissioned as a Second Lieutenant in the Air Corps Reserve in October 1929 and thereafter received a regular commission in the USAAC in 1930.[4]

WORLD WAR II

Following the attack on Pearl Habour in 1941, the US was engaged in WWII. LeMay led the 305th Bombardment Group who were deployed to England in September 1942.[5] Out of all the pilots in the group, he was the only one to have flown a B-17.[6] LeMay led the group till 1943. His contributions included the development of advanced bombing tactics such as pattern bombing and combat box formation. In an interview regarding his involvement in the 305th Bombardment Group, LeMay said that his greatest fear was that his men 'didn't have any confidence in their commander—me!'[7] Subsequently in 1943, he became the first commander of the 3rd Air Division. During his tenure as commander of the 3rd Air Division, he led 146 B-17s in the Schweinfurt-Regensburg mission to Regensburg, Germany

where they struck Luftwaffe and its infrastructure prior to the invasion of Europe. However, during the mission, they lost 24 bombers in the process.[8]

In August 1944, as the youngest Major General, LeMay was deployed to the China-Burma-India theatre. In his time there, he commanded the new XX Bomber Command. The XX Bomber Command was a unit of the Twentieth Air Force that was active from 1st March, 1944, to 16th July, 1945, and was based in China and supervised B-29 raids on the home islands of Japan. Subsequently, with the capture of the Marianas Islands, LeMay took over command of XXI Bomber Command in January 1945. Working from bases in Guam, Tinian and Saipan, the B-29s struck targets in Japanese cities. From the outcome of the strikes, LeMay discovered that high-altitude bombing over Japan was ineffective.[9]

As a result, LeMay switched to low-altitude night-time raids. Colonel William Fisher, a senior staff member, informed Major General LeMay that bomber pilots were pulling out from low altitude bombing due to anti-aircraft fire from Japanese forces. As a result, Colonel Fisher suggested to Major General LeMay that crews who have achieved the successful strike rates should be released from their deployment. This was an incentive meant to motivate LeMay's men to execute their tasks more competently. LeMay implemented this plan and the strike rate went up to 80%.

In the wee hours of 9th March, 1945, a group of airmen met in Tinian and Saipan for a briefing. They were planning an attack on Tokyo. However, this was no ordinary attack—the planes would be stripped of all guns except for the tail turret. The bombers were ordered to fly in formations at 5,000 to 9,000 feet. The first plane arrived over Tokyo just after midnight on 10th March. Following British bombing practice, they marked the target area with a flaming 'X'. In a three-hour period, the main bombing force dropped 1,665 tons of incendiary bombs. This firebombing campaign against Japan, led by LeMay, were one of the reasons that caused Japan to surrender.

Moreover, LeMay also oversaw Operation Starvation, a naval mining operation in which vital water routes and ports of Japan were naval mined in order to disrupt enemy shipping.[10] LeMay assigned the entire 313th Bombardment Wing, about 160 airplanes, to the task, despite the fact that his superiors were not supportive of the operation objective.

POST WORLD WAR II

After the war, LeMay held the post of commander of USAF Europe. In that position, he directed operations for the Berlin Airlift.

Berlin Airlift

The Berlin Airlift was an international crisis that occurred from 1948 to 1949. Instigated by the Soviet Union, it attempted to force Western Allied powers to abandon their post–WWII administration in West Berlin. Under LeMay's leadership, Douglas C-54 Skymasters began supplying the city with an average of 5,000 tons of supplies each day. The airlift continued for 11 months, with 213,000 flights operated by six countries. They brought in 1.7 million tons of food and fuel to Berlin. The end of the blockage occurred in 12th May, 1949, when the Soviet Union lifted its blockade against West Berlin. On 23rd May, West Germany was established. The Berlin Airlift ended on 30th September and an effort to build a year's supply of goods for West Berlin in the event of another blockade was initiated.[11] Although LeMay is publicly recognised for the success of the Berlin Airlift,

it was General Lucius D. Clay who prompted LeMay to maintain the airlift.

Strategic Air Command

When LeMay assumed command of the Strategic Air Command (SAC) in 1948, he said flatly: "We didn't have one crew, not one crew in this entire command who could do a professional job."[12] This comment came after LeMay's observation of a mock bombing exercise in Dayton, Ohio where most of the strategic bombers who were assigned to the mission missed their targets by 1.6 kilometre or more. His job over the next 10 years was to build the organisation into a global striking force that would have control of the land-based strategic bomber aircraft and intercontinental ballistic missiles.

LeMay concentrated on expanding the SAC. He dissolved the SAC units and reappointed the most competent pilots to atomic strike groups. He ordered onerous missions, such as a 96-hour non-stop flights around the world. LeMay directed an exercise to simulate bombing of the Soviet Union in June 1950, involving B-29s. Out of the 17 targets that were American cities, the bombs 'hit' every target.

Not long later, North Korea invaded South Korea, marking the start of the Korean War.[13] The LeMay-led SAC was ready to bomb North Korea, except it did not have nuclear bombs. LeMay wanted the planes to be armed with nuclear bombs so that it can be used at any time.

Dropping nuclear bombs on major North Korean cities was also LeMay's idea to force an end to the Korean War. His superiors disapproved of this idea as such an attack would be devastating and would destroy the lives of many civilians.

After China joined the war in late 1950, General Douglas MacArthur ordered the firebombing of North Korean industrial targets. American aircraft dropped high explosives and napalm on North Korean urban areas. In addition, they also bombed irrigation dams which destroyed North Korean agriculture.

After the Korean War, in 1956 and 1957, LeMay implemented tests of 24-hour bomber and tanker alerts, keeping some bomber forces ready at all times. LeMay headed SAC until 1957, overseeing its transformation into a modern and efficient fighting force.

USAF Chief of Staff

LeMay was the fifth Chief of Staff of the USAF from 1961 to 1965. This promotion came after he served as USAF Vice Chief of Staff from 1957 to 1961.

As Chief of Staff, his duties included executing approved plans and supervision of members of the Air Force. In addition, LeMay also performed other duties assigned by the President, Secretary of Defence or Secretary of Air Force.[14] Furthermore, the efficacy of strategic air campaigns over tactical strikes and ground support became air force policy during his tenure. However, his tenure was also marked with conflict. LeMay was often in dispute with his superiors including the Secretary of Defence, Robert McNamara, Secretary of the Air Force, Eugene Zuckert, and Chairman of the Joint Chiefs, General Maxwell Taylor.

During the time LeMay was in office, budget constraints and nuclear war fighting strategies left the forces in disarray. At the pinnacle of this crisis, the US Army had to reorganise its combat divisions to fight its wars on irradiated nuclear battlefields, developing short-range atomic cannon and mortars in order to win appropriations. The US Navy proposed delivering strategic

nuclear weapons from supercarriers intended to sail into the range of the Soviet air defence forces. Of all these various schemes, only LeMay's command structure of SAC survived complete reorganisation in changing the reality of the Cold War. LeMay himself was not an enthusiast of the Intercontinental Ballistic Missile (ICBM) programme. He regarded ballistic missiles as 'toys' and not an alternative for the strategic nuclear bombing force.[15]

Although LeMay was unable to get replacements for the Skybolt Air-Launched Ballistic Missile (ALBM) and Boeing B-52 Stratofortress, he was successful in increasing the expenditure of the USAF.[16] Moreover, he strongly supported the military space programmes to perform satellite reconnaissance and gather electronic intelligence.

The Vietnam War

During the Vietnam War, LeMay advocated the use of nuclear weapons on North Vietnam. However, his advice was ignored and instead, an incremental policy was implemented that focused on limited interdiction bombing of fluid enemy supply corridors in Vietnam, Laos and Cambodia.[17] This short campaign failed to obliterate enemy supplies.

In his 1965 autobiography, with regards to his response on North Vietnam, LeMay was famously quoted as saying: "They've got to draw in their horns and stop their aggression, or we're going to bomb them back into the Stone Age. And we would shove them back into the Stone Age with air power or naval power—not with ground forces."[18] Some military historians argued that LeMay's theories were eventually proven correct. In December 1972, President Richard Nixon ordered Operation Linebacker II, a high intensity Air Force, Navy and Marine Corps aerial bombing campaign. Linebacker II was followed by renewed negotiations that led to the Paris Peace Agreement.[19] However, consideration must be given to significant differences in terms of both military and geopolitical realities between 1968 to 1972.

POST-MILITARY CAREER

Due to LeMay's interests conflicting with the Johnson administration regarding the Vietnamese policy and LeMay's 'hostility' towards Robert McNamara, he was eventually forced to retire in February 1965. When LeMay retired from the air force, he was the longest serving four-star general from the air force to date.[20]

LeMay contested in the 1968 Presidential Election with George Wallace as his running mate. Coincidently, Wallace served as a sergeant in a unit commanded by LeMay during WWII. Wallace was contesting to be president and LeMay was contesting to be vice president.

During the campaign, Wallace's staff began to consider LeMay to be 'politically tone-deaf'. The comment that LeMay famously made about North Vietnam received significant publicity but LeMay disclaimed the comment. In an interview regarding this comment, he said: "I never said we should bomb them back to the Stone Age. I said we had the capability to do it."[21]

However, Wallace-LeMay received 13.5% of the popular vote or 46 electoral votes, which is higher than most third party candidates.

DEATH

In his last years, LeMay led a quiet life. In 1989, he moved to Air Force Village West, a retirement community for former Air Force officers near March Air Force Base in Riverside. He passed away on 1st October, 1990, due to complications arising from a heart attack. He is buried in the USAF Academy Cemetery in Colorado Springs, Colorado.

CONCLUSION

The USAF is filled with many passionate and proficient men and women who dedicated their lives to protect the image of the Air Force and the sovereignty of their nation. Curtis LeMay is no different from these group of men and women. His favourite quote is: "Don't do anything half-heartedly, even if it is a wicked and self-destructive avocation like smoking cigars."[14] Indeed, this quote reflects LeMay's philosophy and paved the way for the numerous achievements LeMay accomplished when he was in service. Certainty, without LeMay, the USAF would not be where it is today. The contributions he has made created shock waves, reaching to people of all walks of life and affirm the importance of having competent individuals like LeMay to lead the military to greater heights.

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6. This made him the de-facto leader of the group, paving the way for his rapid development and progress in the position of being a leader.
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9. High altitude bombing was ineffective because the wind from high altitude will deviate the bomb away from its target.
10. Naval mining is using underwater explosive devices that is intended to sink ships, submarines such that they are prevented from entering an area. In addition, they are used defensively – such as protecting friendly vessels or offensively – such as hampering enemy ship movements.
11. "Berlin Blockade Lifted", *History*, 2010, https://www.history.com/this-day-in-history/berlin-blockade-lifted
12. Richard Rhodes, *Dark Sun: The Making Of The Hydrogen Bomb* (New York City, US: Simon & Schuster, 2012), 21
13. Ibid
14. Cullather, Nick, "Back into the Stone Age: Origins of a cliché", *The Asia-Pacific Journal – Japan Focus*, October 2, 2006, http://apjjf.org/-Nick-Cullather/2245/article.html
15. LeMay put ballistic missiles as the last priority for the SAC. He also regarded them as political and psychological weapons.
16. The Boeing B-52 Stratofortress was used by the SAC to deter and offset the Soviet military from developing and modernising, during the Cold War. Thus, this gave the USAF an advantage in carrying out its missions. The Skybolt ALBM was an air-launched ballistic missile that was developed by the USAF to counteract the Soviet Union's ICBMs. This was so as to increase the air power with regards to the situation of a surprise attack staged by the Soviets.
17. By doing this, it ensured that the communist army in North Vietnam engagement with the troops from South Vietnam is impeded.
18. L. Douglas Keeney, *15 minutes: General Curtis LeMay and the countdown to nuclear annihilation* (New York City, US, St. Martin's Griffin, 2012), 69.

19. The Paris Peace Agreement was a peace treaty signed on January 27, 1973 to establish peace in Vietnam and to end the Vietnam War. It meant the end of direct US combat and temporarily stopped fighting between North and South Vietnam.

20. "10 US Code § 8033 – Chief of Staff", *Law Cornell*, 27 April, 2018, https://www.law.cornell.edu/uscode/text/10/8033

21. Curtis LeMay , *AZ Quotes, http://www.azquotes.com/quote/1124357*

Quotable Quotes

The future is indeed unknowable. Travelling in a time capsule into the future is not the same as taking a plane on a scheduled flight. There are no control towers to guide you. Even if the route is planned, sudden storms may veer the capsule from its planned journey. But if the travellers are well-prepared, mentally, psychologically and physically, like the astronauts, they stand a better chance of survival in the unknowable future.
-Goh Chok Tong (b. 1941), former Prime Minister and Emeritus Senior Minister of Singapore.

Anyone can make war, but only the most courageous can make peace.
-Donald J. Trump (b. 1946), 45th President of the United States.

Even today we raise our hand against our brother... We have perfected our weapons, our conscience has fallen asleep, and we have sharpened our ideas to justify ourselves as if it were normal we continue to sow destruction, pain, death. Violence and war lead only to death.
-Pope Francis (b. 1936), 266th and current Pope and sovereign of the Vatican City State.

War is hell. You can't photograph a flying bullet, but you can capture genuine fear.
-Horst Faas (1933-2012), German photo-journalist and two-time Pulitzer Prize winner.

Wars are poor chisels for carving out peaceful tomorrows.
- Martin Luther King, Jr. (1929-1968), leader in the African-American Civil Rights Movement.

Anger and intolerance are the enemies of correct understanding.
-Mahatma Ghandi (1869-1948), father of the Indian Independence Movement.

Success is most often achieved by those who don't know that failure is inevitable.
-Coco Chanel (1883-1971), French fashion designer and a business woman

Courage is grace under pressure.
-Ernest Hemingway (1899-1961), American novelist, short story writer, and journalist

It does not matter how slowly you go, so long as you do not stop.
-Confucius (551BC – 479BC), Chinese thinker and social philosopher

Success is walking from failure to failure with no loss of enthusiasm.
-Winston Churchill (1874-1965), Former Prime Minister of the United Kingdom, military officer, historian, writer, artist and Nobel Prize winner in Literature.

Try not to become a person of success, but rather try to become a person of value.
-Albert Einstein (1879-1955), theoretical physicist.

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For example:

Tim Huxley, *Defending the Lion City: The Armed Forces of Singapore* (St Leonard, Australia: Allen & Unwin, 2000), 4.

Huxley, *Defending the Lion City,* 4.

Ibid., 4.

Edward Timperlake, William C. Triplett and William II Triplet, *Red Dragon Rising: Communist China's Military Threat to America* (Columbia: Regnery Publishing, 1999), 34.

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Chan and Lew, "The Challenge of Systematic Leadership Development in the SAF," 39-50.

Ibid., 39-50.

Mark J. Valencia, "Regional Maritime Regime Building: Prospects in Northeast and Southeast Asia," *Ocean Development and International Law* 31 (2000): 241.

Articles in Books or Compiled Works

Michael I. Handel, "Introduction," in *Clausewitz and Modern Strategy,* ed. Michael I. Handel, (London: Frank Cass, 1986), 3.

H. Rothfels, "Clausewitz," in *Makers of Modern Strategy: Military thought from Machiavelli to Hitler,* eds. Edward Mead Earle and Brian Roy, (Princeton: Princeton University Press, 1971), 102.

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For example:

David Boey, "Old Soldiers Still Have Something to Teach," *The Straits Times,* 28 September 2004, 12.

Donald Urquhart, "US Leaves it to Littoral States; Admiral Fallon Says Region Can Do Adequate Job in Securing Straits," *The Business Times Singapore,* 2 April 2004, 10.

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For example:

Liaquat Ali Khan, "Defeating the IDF," *Counterpunch,* 29 July 2006, http://www.counterpunch.org/khan07292006.html.

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For example:

International Committee of the Red Cross, "Direct participation in hostilities," 31 December 2005, http://www.icrc.org/Web/eng/siteeng0.nsf/html/participation-hostilities-ihl-311205.

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"Newly unveiled East Jerusalem plan put on hold," *BBC News*, 2 March 2010, http://news.bbc.co.uk/2/hi/middle_east/8546276.stm.

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