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UNMANNED AERIAL SYSTEMS PROLIFERATION: WHAT DOES IT MEAN TO MILITARY PLANNERS?

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Exercise Solo Flight

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EXERCISE *SOLO FLIGHT* – EXERCICE *SOLO FLIGHT*

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Maj E.D. Deneau

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INTRODUCTION

During a recent discussion with the new Chief of Defence Staff (CDS), he stated “Conventional warfare is on the rise.”¹ Conventional warfare involves traditional air threats such as fixed wing aircraft, rotary wing aircraft, missiles, rockets, mortars, and artillery, but now, more than ever includes the use of Unmanned Aerial Systems (UAS) in surveillance, targeting, or attack roles. The CDS openly acknowledges that Canada should procure and employ armed UAS. Unfortunately the new CDS inherited a force which, besides an ageing CF-18 fleet, lacks the capability to prevent the enemy from interfering from the air with the conduct of operations on the ground.

The nature of the threat has changed. According to Dr. Karber, the Harvard educated President of the Potomac Foundation and internationally recognized expert in defense and national security matters, the impact of UAS proliferation and employment is revolutionary.² In his 2015 report concerning the lessons learned in the Russo-Ukrainian war, he noted that both sides are using a number of types of UAS, all varying in altitude, range and endurance capabilities but the greatest impact is coming from the Russian use of operational and tactical level UAS.³

In addition to conventional forces, the employment of UAS by terror organizations has increased over the past decade.⁴ According to a report authored by Dr. Todd Humphreys and submitted to the U.S. House Committee on Homeland Security, “never before have highly-capable UAVs been so inexpensive and widely available...one can buy over the internet today a

¹ CDS, (discussion, Toronto, ON, Thursday, 4 February 2016), with permission.

² Phillip Karber. "Lessons Learned from the Russo-Ukrainian War." *John Hopkins Applied Physics Laboratory and U.S. Army Capabilities Center*, (July, 2015): 11, <https://prodev2go.files.wordpress.com/2015/10/rus-ukr-lessons-draft.pdf>.

³ *Ibid.*

⁴ Milton Hoenig, "Hezbollah and the Use of Drones as a Weapon of Terrorism," *Public Interest Report* (2014): 1.

UAV that rivals the...surveillance and guidance capability of military UAVs.”⁵ The global proliferation and accessibility of UAS has now made it possible for a terrorist of any kind, from a lone-wolf to ISIS to buy a cheap UAS and turn it into an aerial Improvised Explosive Device (IED) or a surveillance tool.⁶

What does the proliferation of UAS and their accessibility to the public mean to the Canadian Armed Forces (CAF) military planner? This paper will prove that the proliferation of UAS has fundamentally changed the way we must plan for military operations.

This paper will first detail the proliferation of UASs over the past 10 years in Russia, China, the UK, the US, and within Canada, and explain why, numerically, the proliferation of UAS is relevant to military planners. This paper will then explore UAS employment by our possible state and non-state adversaries, detailing the implications UAS employment has on military planning and the conduct of military operations across the spectrum of military operations. Finally, due to the current debate regarding the employment of armed UAS and the CDS’ desire to employ armed UAS; this paper would be incomplete if it did not briefly address the legal and moral implications through the framework of the Just War theory. This paper will culminate with a conclusion.

UAS PROLIFERATION QUANTIFIED

The words drone, Unmanned Aerial Vehicle (UAV), and Unmanned Aerial system (UAS) are now part of daily parlance amongst the public and military communities. For the purpose of this paper, these words are taken and used synonymously, though the author recognizes the technical differentiation between the terms. From the CDS expressing interest in employing

⁵ Humphreys, Todd. "Statement on the Security Threat Posed by Unmanned Aerial Systems and Possible Countermeasures," *House Committee on Homeland Security*, (2015): 2.

⁶ Dinesh Sathyamoorthy. "A Review of Security Threats of Unmanned Aerial Vehicles and Mitigation Steps," *Science and Technology Research Institute for Defence*, (Ministry of Defence, Malaysia, October, 2015): 1.

armed UAS, to the U.S. drone strikes in Pakistan, to commercial entities planning to deliver packages to your home via UAS, to hobbyists protesting restrictions on their personal use of UAS; the discussions surrounding UAS permeate society. Just as discussions surrounding UAS proliferates, so too does the actual proliferation of UAS, to states, non-state actors, and individual citizens.

According to a 2012 report published by the United States (US) Government Accountability Office (GAO), “since 2005, the number of countries that acquired an unmanned aerial vehicle (UAV) system nearly doubled from about 40 to more than 75.”⁷ Not only is this trend well established, it is expected to increase. According to another US Department of Defence Report in 2013, global UAS spending is expected to double over the next decade to a total of \$89 Billion dollars per year.⁸

Numerous taxonomies exist in order to classify drones by size, capability, or intended use. The 2012 GAO report refers to mini, tactical, and strategic UAS. A mini UAS flies at low altitude, has an endurance of approximately an hour, has a short range of approximately 10 kilometers or less, and is capable of carrying limited payload. An example of a mini UAS is the Raven. A tactical UAS flies at low to medium altitude, has a medium endurance of several hours, has a line of sight range of 300 kilometers or less, and is capable of carrying a small payload. Examples of tactical UAS are the Shadow and Scan Eagle. Finally, the strategic UAS flies at medium to high altitude, has an endurance of hours to days, has a long range in excess of 300 kilometers, and is capable of carrying a large payload. Examples of strategic UAS are the Global

⁷ United States Department of Defence "Agencies Could Improve Information Sharing and End-Use Monitoring on Unmanned Aerial Vehicle Exports." (2012): 9.

⁸ DOD. "Unmanned Systems Integrated Roadmap FY 2013-2038." (2013): 4.

Hawk, Heron, and Reaper.⁹ A 2015 study published by the Center for a New American Security (CNAS) as part of a joint project with the US Technology and National Security Program employs a different taxonomy, classifying UAS as either hobbyist, midsize military and commercial, large military specific and stealth combat UAS. The hobbyist UAS has limited payload capacity and limited range and persistence. An example of a hobbyist UAS is the Raven. Midsize military and commercial UAS have a moderate payload and moderate range and persistence. An example of this type is the Scan Eagle. Large military specific UAS have a larger payload capacity and long range and persistence. Finally, the stealth combat UAS have a large payload capacity, long range and persistence, and are designed using stealth technology.¹⁰ While similar, both taxonomies differ slightly and require the use of a taxonomy blending the two. A third taxonomy is used by the RAND Corporation in their 2014 Report on UAVs and U.S. Security¹¹, though the specific taxonomy is not employed herein, the important aspect is the trend that emerged through the various taxonomies, in that all reports agree that UAS proliferation is increasing dramatically.

The aforementioned taxonomies differ for various reasons, such as the purpose of the respective reports, the availability of each classification of UAS, and the fact that much of the technology used in UAS construction and development is considered dual use technology. The European Commission defines dual-use technology as “goods, software, and technology that can be used for both military and civilian applications.”¹² For example dual-use technology exists in the Inertial Navigation Units (INU) of some UAS as this technology is also employed in

⁹ United States Department of Defence "Agencies Could Improve Information Sharing and End-Use Monitoring on Unmanned Aerial Vehicle Exports." (2012): 4.

¹⁰ Kelley Saylor. "A World of Proliferated Drones." Center for a New American Security (2015):9.

¹¹ Davis, Lynn E., Michael J. McNerney, James Chow, Thomas Hamilton, Sarah Harting, and Daniel Byman. "Armed and Dangerous? UAVs and US Security." RAND CORP, (2014): 3-4.

¹² European Commission on Trade. <http://ec.europa.eu/trade/import-and-export-rules/export-from-eu/dual-use-controls/>. Accessed 1 May 2016.

common video game controllers.¹³ It is the availability of UAS to various entities, the employment of UAS by state and non-state actors, and the fact that UAS employ dual-use technologies that enables UAS proliferation to be further examined in terms of military UAS proliferation, and civilian UAS proliferation.

Military Proliferation

The number of UAS intended for military use is increasing and this proliferation will impact heavily on the planning of military operations in terms of airspace and frequency management, and in terms of workload; any military Coalition operations will see an increase in troop contributing nations employing UAS within the area of operations. Further, our adversaries, whether conventional such as Russia or China, or unconventional such as ISIS, will also increasingly employ UAS against our forces as UAS technology becomes cheaper and UAS in general, more easily obtainable. The increase of state employed UAS necessitates that military planners plan for and coordinate the use of the airspace, both in order to prevent mid-air collisions with various airspace users, such as pilots and the artillery, and to maximize the efficient friendly use of the increasingly busy airspace. Further, it necessitates that military planners account for and plan the use of the electromagnetic spectrum in order to deconflict radio frequency use and bandwidth used by the ever increasing number of UAS in the battlespace. The proliferation of UAS amongst non-state actors requires a change in how military operations are planned. Military planners must now plan to counter the increasing UAS threat, a factor not previously required in the planning process of an unconventional war.

¹³ Davis, Lynn E., Michael J. McNerney, James Chow, Thomas Hamilton, Sarah Harting, and Daniel Byman. "Armed and Dangerous? UAVs and US Security." RAND Corp, (2014): 4.

The 2014 RAND Report concludes that “more than 70 countries have acquired UAVs of different classes and for different purposes.”¹⁴ The Report further states that military spending on armed UAS “will increase from \$6.6 billion in 2013 to \$11.4 billion in 2022.”¹⁵ This Report also states that of the over 70 countries that have acquired UAS, 50 countries are developing UAS, and of those, 23 countries are manufacturing and selling armed UAS, and of those, 8 countries are manufacturing and selling strategic armed UAS. Notable countries in that final 8 are Russia, China, Pakistan, and Iran.¹⁶ Given this final list and their congruence in terms of which countries are possible future adversaries, and given that if these countries are manufacturing the most sophisticated UAS, it is reasonable to conclude that if conflict arises between the Western world and this list of adversaries, the conflict will undoubtedly involve an increased number of UAS of all classifications.

Although it was once true that UAS were available only to states and wealthy corporations, this is no longer the case. It is not only state actors who are acquiring new or more UAS. According to the 2015 CNAS Report, non-state actors or terrorist groups such as the Islamic State of Iraq and Syria (ISIS), Libyan rebel groups, Hamas, and Hezbollah are already in possession of tactical UAS.¹⁷ Further, “as this technology continues to proliferate, simple weaponized drones will be increasingly within the reach of virtually any state and many non-state actors.”¹⁸ According to the RAND Corporation, as state and non-state actors, such as terrorist organizations gain access to UAS, parties may be more likely to intervene in all natures of conflict than ever before, undermining stability, introducing new threats, and simply changing

¹⁴ Davis, Lynn E., Michael J. McNerney, James Chow, Thomas Hamilton, Sarah Harting, and Daniel Byman. “Armed and Dangerous? UAVs and US Security.” RAND CORP SANTA MONICA CA, (2014): 7.

¹⁵ *Ibid.*

¹⁶ *Ibid.*, 9.

¹⁷ Kelley Saylor. “A World of Proliferated Drones.” Center for a New American Security (2015):8.

¹⁸ Kelley Saylor. “A World of Proliferated Drones.” Center for a New American Security (2015):8.

the calculus used for force employment.¹⁹ Put simply, the proliferation of UAS, both armed and unarmed, represents fundamental change to military planning across the spectrum of conflict.

Civilian Proliferation

“We are living, increasingly, in a drone-saturated world. In recent years, drones, or unmanned aerial vehicles (UAVs), have proliferated rapidly around the globe in both military and civilian spheres.”²⁰ The popularity of mini UAS or hobbyist drones has exploded in recent years. To quantify this explosion, consider that the largest manufacturer of this class of drone has increased its annual revenue by almost 25,000 percent since 2011.²¹ The effect of the civilian proliferation of UAS will see a “...reduction in cost and increase in drone capabilities. This development will in turn grant individuals and non-state actors – particularly those without state patrons – unprecedented access to highly advanced technologies.”²² Compounding the problem of civilian UAS, sales are not tracked, and UAS can be constructed at home in a garage or a basement. The materials used for construction are almost untraceable, they are difficult to find by radar, and are thus very difficult to track, identify, and regulate.²³ This is significant to military planners because these mini or hobbyist drones, not only clutter the airspace and pose hazards to other aircraft, but because they can easily be used for nefarious purposes. These purposes are discussed in the following section.

Implications

Due to the proliferation of UAS, future coalition operations will likely involve troop contributing nations that employ UAS. The civilian proliferation of US further complicates this

¹⁹ Davis, Lynn E., Michael J. McNerney, James Chow, Thomas Hamilton, Sarah Harting, and Daniel Byman. “Armed and Dangerous? UAVs and US Security.” RAND CORP SANTA MONICA CA, (2014): 15.

²⁰ Kelley Saylor. “A World of Proliferated Drones.” Center for a New American Security (2015):5.

²¹ *Ibid.*, 11.

²² *Ibid.*

²³ *Ibid.*, 12.

as civilian and commercial UAS users may not plan for the use of the airspace, thereby adding to the risk levels for military airspace users and civilian airspace users alike. Further, the nature of the construction materials used to build smaller mini UAVs coupled with the small radar cross-section they provide, and the altitudes at which they operate, will make it difficult for military radars to identify UAS in-flight. The increased number of UAS employed within an operating environment will tax airspace managers and military planners, and the risk to airspace users will increase with it. Proliferation of UAS in quantity alone increases the availability to state and non-state actors alike. As technology increases and becomes less expensive, lone wolf terrorists or terrorist groups will acquire UAS containing what we now see as military grade technology. These groups could simply construct UAS themselves as these parts are difficult to track, they are not controlled, and they employ dual-use technology. To use a classic military Clausewitzian metaphor; the proliferation of UAS numerically, adds fog to the fog of war, forcing military planners to work harder in order to see through the fog. As such, the proliferation of UAS of all classifications, by both military and civilian users globally, fundamentally changes how military planners must plan for operations.

What are the uses for these systems? How could the unmanned aerial systems be used for and against Western forces? What are the implications for military planners? These questions are the focus of the following section.

UAS EMPLOYMENT

The previous section dealt with the numerical significance of UAS proliferation, and this proliferation poses significant challenges to military planners; however, as UAS proliferation continues it brings with it capabilities formerly reserved for conventional militaries, and not previously afforded to non-state actors. It is in the employment of UAS that the most

fundamental changes are forced upon military planners. UAS proliferation has changed the balance of air power; it has bridged the gap desired in technological overmatch and in doing so, it allows non-state actors to punch above their weight. In fact UAS proliferation now provides our non-state adversaries the possibility of achieving overmatch against a much larger Western coalition force. Disconcertingly, Western forces are ill-equipped to counter this proliferating threat.

Conventional Military Employment

“As the number of countries with (armed UAS) increases, it will likely alter the nature of future conflicts because countries will be able to field a larger number of strike assets without risking their manned aircraft.”²⁴

The 2015 CNAS Report highlights various benefits derived from the conventional military use of drones, from delivery drones, to surveillance drones used for targeting, mapping, improving communications ranges for ground forces, and generally improving situational awareness and coordination, and of course, limiting the risk to friendly ground forces.²⁵ The benefits of UAS employment are great and varied, though through UAS proliferation, one must keep in mind that as others gain access to UAS, they too enjoy the same benefits.

The CAF’s recent acquisition of the Raven provides an example of how a mini UAS can require military planners to make fundamental changes in the way they plan for and conduct military operations. In 2014, the Canadian Army (CA) fielded the Raven with the Royal Regiment of Canadian Artillery, who now employs the UAS at Infantry Company level. In order to fulfil this new force employment concept, the CA planners had to fundamentally reconsider the way operations are planned at Combat Team level, as airspace now had to be coordinated,

²⁴ United States Department of Defence "Agencies Could Improve Information Sharing and End-Use Monitoring on Unmanned Aerial Vehicle Exports." (2012): 18.

²⁵ Kelley Saylor. "A World of Proliferated Drones." Center for a New American Security (2015):15.

tactics changed due to the reduced likelihood of meeting engagements, and targeting procedures had to be refined. In short, UAS proliferation within the CAF required a fundamental change in the planning and conduct of military operations.²⁶

Phillip Karber's report on lessons learned from the ongoing Russo-Ukrainian war provides a current account of how a future potential conventional adversary is currently employing UAS using both conventionally as well as more innovative tactics. The Russian emphasis on the employment of mini and tactical UAS in the Ukraine is different from the Coalition employment of UAS in Afghanistan. The Russians have proven their ability to dramatically reduce the time involved in executing the kill chain, shortening the sensor to shooter link by using fourteen (14) different types of UAS.²⁷ UAS are employed in roles conducive to the exploitation of all of the capabilities UAS can provide, such as surveillance, reconnaissance, and target acquisition. Tactical UAS are employed as targeting support for Multiple Light Rocket System (MLRS) engagements and mini UAS are employed to provide Battle Damage Assessment (BDA).²⁸ According to Karber, "the increased availability of overhead surveillance, coupled with massed area fires of artillery and MLRS has produced a new level of intensity in modern conventional combat."²⁹ This new level of intensity in combat is made possible by the employment of UAS, and by the innovation of Russian military planners regarding how these UAS are employed. They devolved the Target Engagement Authority (TEA) down to sub-unit level, accepting risk in order to reduce the time it normally takes to find, fix, and strike an adversary, and in doing so they effectively shorten the kill chain. This innovation in Russian employment of UAS lends

²⁶ The author is the former Chief Instructor-in-Gunnery for the Royal Regiment of Canadian Artillery and was intimately involved in the planning for and fielding of the Raven UAS within the CAF.

²⁷ Phillip Karber, "Lessons Learned from the Russo-Ukrainian War." *John Hopkins Applied Physics Laboratory and U.S. Army Capabilities Center*, (July, 2015): 11.

²⁸ Phillip Karber, "Lessons Learned from the Russo-Ukrainian War." *John Hopkins Applied Physics Laboratory and U.S. Army Capabilities Center*, (July, 2015): 11.

²⁹ *Ibid.*, 41.

credence to the words of renowned author and academic Mikkel Vedby Rasmussen, who writes “if you are prepared to accept risks that your competitors are not, then you will forge ahead as they stop at the brink while you take the leap...In a risk adverse world, the risk-taker is king.”³⁰

Instead of assuming or accepting risk, Western militaries have taken the opposite approach, one of the ‘tactical General, or possibly the “tactical President’. Rasmussen describes how in 2001, President George Bush watched as a Predator UAS flew over Afghanistan,³¹ essentially giving birth to the tactical President. John Gentry, a retired military officer, former CIA intelligence analyst, and assistant professor of irregular warfare at the U.S. National Defense University expands on this concept, writing that UAS and the connectivity they enable “increases the Generals’ ability to micro-manage tactical operations from afar...to the detriment of initiative, operational performance, and the morale and retention of junior officers.”³²

If CF planners do not appreciate these very different procedural outcomes of UAS proliferation and risk management, and react appropriately to the resulting increased combat intensity when planning for conventional operations, the CF will lose the initiative, and likely the conflict as well. “When the West is waging war on the premise of lowering risks, then the best counter-strategy is to be willing to take risks.”³³

Unconventional Employment

The first section of this paper established that UAS proliferation has placed both mini and tactical UAS in the hands of non-state actors around the world, and that the proliferation will continue. According to the 2015 CNAS Report, the mini or small UAS “hold the greatest

³⁰ Mikkel Vedby Rasmussen. *The Risk Society at War: Terror, Technology and Strategy in the Twenty-First Century*. Cambridge University Press. (2006): 40.

³¹ *Ibid.*, 43.

³² John A Gentry. “Doomed to Fail: America’s Blind Faith in Military Technology.” *Parameters* 32, no.4 (2002): 100.

³³ Mikkel Vedby Rasmussen. *The Risk Society at War: Terror, Technology and Strategy in the Twenty-First Century*. Cambridge University Press. (2006): 44.

disruptive potential for achieving overmatch against the United States in the near term.”³⁴ The author makes this monumental statement due to the facts that mini UAS technology is constantly improving in terms of range, payload capacity, optics improvements, and their capability for autonomous flight.³⁵ Further, mini UAS are generally constructed from parts lacking identifiable markings, which will make attribution difficult in the event of an attack.³⁶ The Rand Report substantiates the CNAS conclusion that non-state actors and conventional militaries alike will eventually employ mini UAS as Airborne Improvised Explosive Devices (AIED) which have the potential to kill or injure significant numbers of Western forces,^{37,38} and will be extremely difficult for Western forces to defeat given that their presence is difficult to detect.³⁹ Finally, our adversaries could employ swarming tactics, using multiple mini UAS simultaneously, to overwhelm air defence systems (if any are present) protecting ships and bases, or they could temporarily deny Western access to airspace, land, and to the sea.⁴⁰ Using these tactics could allow “...an individual, non-state actor, or state to achieve capability overmatch against the United States.”⁴¹ As such, CF planners can no longer plan to operate with air supremacy when conducting stability operations, and much less so when conducting conventional warfare.

A number of recent events highlight the threat that the mini and tactical UAS pose to our security. In September 2013, a protester crashed a hobbyist UAS in front of the German Chancellor during a rally.⁴² In 2015 there were two White House incidents involving UAS.⁴³

³⁴ Kelley Sayler. "A World of Proliferated Drones." Center for a New American Security (2015):29.

³⁵ *Ibid.*

³⁶ *Ibid.*

³⁷ Davis, Lynn E., Michael J. Mc Nerney, James Chow, Thomas Hamilton, Sarah Harting, and Daniel Byman. "Armed and Dangerous? UAVs and US Security." RAND CORP SANTA MONICA CA, (2014): 12.

³⁸ Kelley Sayler. "A World of Proliferated Drones." Center for a New American Security (2015):29.

³⁹ *Ibid.*

⁴⁰ *Ibid.*

⁴¹ *Ibid.*

⁴² Dinesh Sathyamoorthy. "A Review of Security Threats of Unmanned Aerial Vehicles and Mitigation Steps," Science and Technology Research Institute for Defence, (Ministry of Defence, Malaysia, October, 2015): 2.

Again in 2015, a UAS was involved in an incident at the Kuala Lumpur Airport in Malaysia.⁴⁴ Finally, in April 2015, a UAS was landed on the roof of the office of Japan's Prime Minister.⁴⁵ These incidents show how susceptible Western forces are to attack or surveillance by tactical or hobbyist UAS, both at home and abroad because they can so easily be used to deliver bombs or bio-chemical agents.⁴⁶ Two such plots were uncovered in the US in 2011 and 2015.⁴⁷

Counter UAS Implications

UAS proliferation has served to lift the fog of war for the enemy.⁴⁸ The employment of UAS by our potential state and non-state adversaries poses a "paradigm shift in ground warfare"⁴⁹ in the manner in which Canadian Forces planners must now plan for and execute military operations in the face of a threat for which Canada and its Western partners are ill-prepared to counter due to capability deficiencies in the realm of Ground Based Air Defence (GBAD).⁵⁰ The threat posed by the proliferation is significant and challenging to defeat. Canadian Army doctrine recognizes that AD capabilities will be required for the conduct of future operations. It states, "while shielding the force will remain an all arms responsibility, specialist roles will still be required, most notably, combat engineers, ground-based air defence, military police and chemical, biological, radiological or nuclear defence."⁵¹ Though the GBAD capability endures in the CAF and as such, the CF is ill-prepared to counter the threats posed, either from a state or a

⁴³ *Ibid.*

⁴⁴ *Ibid.*

⁴⁵ *Ibid.*

⁴⁶ Laurent Beaudoin, Antoine Gademer, Loica Avanthey, Vincent Germain, and Vincent Vittori, "Potential Threats of UAS Swarms and the Countermeasure's Need", in *European Conference on Information Warfare and Security*, p. 24 (Academic Conferences International Limited, 2011), 24.

⁴⁷ Brandon Wallace, J Ryan, and Jon M. Loffi, "Examining Unmanned Aerial System Threats & Defenses: A Conceptual Analysis" *International Journal of Aviation, Aeronautics, and Aerospace* 2, no. 4 (2015): 1.

⁴⁸ Mikkel Vedby Rasmussen. *The Risk Society at War: Terror, Technology and Strategy in the Twenty-First Century*. Cambridge University Press. (2006): 63.

⁴⁹ Kelley Saylor. "A World of Proliferated Drones." Center for a New American Security (2015):29.

⁵⁰ This section draws from the author's extant intellectual property. Specifically, a service paper submitted as partial requirement for successful completion of JCSP 42.

⁵¹ Department of National Defence, D2-188/2007E *Land Operations 2021 Adaptive Dispersed Operations the Force Employment Concept for Canada's Army of Tomorrow*, (Ottawa: DND Canada, 2007), 34.

non-state actor employing UAS against our forces. Facing an increasing air threat is a challenging task for CF planners to overcome.

The Canadian military is not the only modern military unprepared for counter-UAS operations. According to an article written by Colonel Matthew Tedescu of the U.S. Army, the U.S. is also unprepared to counter this intensifying threat. He states further that “militaries that are not examining ways to defend against the use of...UAS are not preparing adequately for the next war.”⁵² Unfortunately, according to the Rand Report, terrorist groups such as Al Qaeda and the Taliban are exploring jamming technology to defeat Western UAS operations.⁵³

Some critics such as Andrew Callum would have us believe that UAVs are unlikely to fundamentally change warfare.⁵⁴ Others at Popular mechanics argue that Western militaries are unprepared because the threat doesn't exist.⁵⁵ This is a classic example of hubris and American exceptionalism to think that the U.S. military is prepared for UAS proliferation. As stated earlier, even senior officers in the U.S. military do not agree with this statement. Martin Libicki, a professor at the RAND Graduate school in Santa Monica argues that the only way to counter the type of warfare ushered in by UAS proliferation and similar technological advancements is to “engage in ‘pop up warfare’, where forces operate like minefields, hiding until the moment they know they can be used.”⁵⁶ Further, Yochi Dreazen, an expert in military affairs and national security; and managing editor for news at Foreign Policy completely disagrees with critics like Callum, stating “drones represent the next evolution of warfare-by-remote-control, when weaponized robotic planes give terrorist groups de facto air forces... drones change the

⁵² Col Matthew T. Tedesco "Countering the Unmanned Aircraft Systems Threat," *Military Review* (2015): 64.

⁵³ Davis, Lynn E., Michael J. McNerney, James Chow, Thomas Hamilton, Sarah Harting, and Daniel Byman. "Armed and Dangerous? UAVs and US Security." RAND CORP SANTA MONICA CA, (2014): 12.

⁵⁴ Andrew Callam. "Drone Wars: armed unmanned aerial vehicles." *International Affairs Review*, 18 (2015).

⁵⁵ Popularmechnics.com, "Killer Lasers Work, but Are They the Best Defense Against UAVs?" last modified [or accessed] 3 May, 2016, <http://www.popularmechnics.com/military/a12250/4302301/>.

⁵⁶ Martin Libicki. "*The Mesh and the Net: Speculations on Armed Conflict in an Age of Free Silicon.*" McNair Paper 28 (Washington, DC: National Defence University, 1994): 12.

equation.”⁵⁷ Even in its most rudimentary use as an AIED, drone proliferation has forced military planners think differently, just as IEDs did years ago. They changed the tactics being employed, and induced both physical and psychological damage on allied forces. They also changed the narrative in the news and at home. As drone proliferation gives states, non-state actors, and civilians the possibilities of attaining overmatch against the world’s superpower, provides these actors de facto air forces, removes the assumption of Western forces operating under air supremacy, it changes the balance of air power, and changes the math, forcing CF planners to attempt to solve the equation in a new and novel manner. This is a fundamentally difficult task for a military that is ill-prepared to counter this new and intensifying threat.

UAS AND JUST WAR THEORY

Previous sections have shown an absence of critics who are willing to state that UAS proliferation is occurring; it is simply a fact at this point. Others are willing to debate the impacts of UAS proliferation but their arguments are easily defeated with research, logic, and again, fact. Conversely, many academics, scholars, military professionals, and civilians are more than willing enter the debate surrounding the employment of armed UAS in the field of ethics. Ethical debates rage concerning the recent use of armed drones by Western forces. In light of the CDS’ comments on the use of armed UAS, the CF must be prepared to enter this debate, or at least control the message if the Canadian government chooses to employ armed drones in the future. This will prove to be a daunting challenge for military planners both in operations and in Public Affairs. In order to frame the elements of this debate this section will briefly describe the classical elements of Just War theory and their use.

A basic synopsis of Just War theory is as follows:

⁵⁷ Yochi Dreazen. "The Next Arab-Israeli War Will Be Fought With Drones." *New Republic* 245, no. 6 (2014): 29.

“Just war theorists have traditionally concerned themselves with the grounds for going to war in the first place (*jus ad bellum* principles) and with that standards of ethical conduct that soldiers are expected to uphold in the course of fighting wars (*jus in bello* principles). Historically such arguments of ethical theory have helped to shape the evolving rules, conventions and policies that govern the practice of war using classic elements of the Just War theory.”⁵⁸

The CNAS Report identifies various questions surrounding the ethical use of UAS: Are states more likely to go to war as a result of the employment of UAS? Does UAS overflight constitute an act of war? If a drone is shot down, is that an act of war? What if a nation cannot conclusively attribute that drone to another nation?⁵⁹ These questions have obvious security implications, but as they are questions that fuel an ethical debate, they are subject to justification via manipulation or spinning of the Just War theory. Some critics, such as Sarah Goodrich⁶⁰ posit that UAS are unethical; others opine that UAS conform to Just War theory and are inherently ethical. Still others, such as Oren Gross claim that the debate is not an ethical one, rather a technophobic expression of “romanticism, religious beliefs, environmental issues, safety considerations, socio-economic and cultural concerns, rejection of human hubris....”⁶¹ History has shown that politicians make their living by making justifications for actions and until the debate informs or influences regulations or laws governing UAS employment, outside the realm of public opinion, perception management, and public affairs, the ethical debate is moot. Perception management is affected as the public now expects that collateral damage should be reduced by the precision capabilities afforded by UAS technology,⁶² thereby making targeting more cumbersome and time consuming. When collateral damage does occur, military planners

⁵⁸ justwartheory.com, “Introductory Materials.” last modified [or accessed] 6 May, 2016, <http://www.justwartheory.com/#INTRODUCTION>.

⁵⁹ Kelley Saylor. "A World of Proliferated Drones." Center for a New American Security (2015):3.

⁶⁰ Sarah Goodrich. “Targeted Killings: How the US Perpetrates Terrorism.” PhD diss., Westminster College, (2014): 43.

⁶¹ Oren Gross. “The New Way of War: Is there a Duty to use Drones?” The Florida Law Review. 67 (2015): 71.

⁶² Mikkel Vedby Rasmussen. The Risk Society at War: Terror, Technology and Strategy in the Twenty-First Century. Cambridge University Press. (2006): 86-88.

are forced to engage in more rigorous perception management or public affairs campaigns due to the resulting moral outrage.

The position of this paper is that UAS are simply a tool with which war can be conducted. This position is shared by Amanda Naaf, and by Milena Sterio who concludes that not only are UAS a tool, in terms of Just War theory, their employment is also ethical.⁶³⁶⁴ Although the CDS has expressed interest in armed UAS, the Canadian government would spend its money more wisely if it were to invest in a viable counter to the proliferating UAS threat rather than on the acquisition of armed UAS.

CONCLUSION

Rasmussen proposed a similar version of the research question explored in this paper. Many of the critics argue as to whether UAS proliferation and related technologies change war, or if drones are decisive, rather it should ask if UAS proliferation and the revolution in the technologies of war have ‘led Western armed forces to rethink strategy.’⁶⁵ Both Rasmussen and this paper conclude that it has and will continue to force changes both in military planning and in the conduct of war. Drone proliferation has ensured that Western militaries now face an unconventional adversary, equipped with 21st century technology and playing by 17th century rules. UAS proliferation has fundamentally changed the way we must plan for military operations. Our adversaries, both conventional and unconventional, do not adhere to the same set of values in terms of the employment of their resources, nor do they share the same adherence to risk mitigation strategies. Their willingness to accept risk in employing their UAS as enablers to

⁶³ Amanda Naaf. “Droning Towards a Shift in the Morality of War?: A Just War Approach to the United States Use of Drones in the War on Terror.” Lund University (2012): 39.

⁶⁴ Milena Sterio. “United States’ Use of Drones in the War on Terror: The (II) legality of Targeted Killings under International Law.” *Case W. Res. J. International*, 45: 214.

⁶⁵ Mikkel Vedby Rasmussen. *The Risk Society at War: Terror, Technology and Strategy in the Twenty-First Century*. Cambridge University Press. (2006): 63.

combat operations as seen in Crimea has changed the decision-action cycle; it has shortened the “kill-chain” and enabled our adversaries to seize the initiative. The proliferation of UAS means that Western militaries can no longer assume they will enjoy air supremacy, or even air superiority due to the potential tactics of swarming and AIED. Through the employment of UAS in this manner, our enemies, both state and non-state in origin, could deny our military forces use of land, sea, and air for at least short periods of time. Military planners must then change the way in which they design their force protective postures as a result of the extant GBAMD capability deficiency. This will drive each element, Air, Land, and Sea to adopt more restrictive and cumbersome protective postures akin to ‘pop-up warfare’. The proliferation of UAS also means that military planners can no longer plan to achieve the element of surprise given the surveillance and targeting capabilities of even the smallest UAS in the hands of insurgents or state actors. Military planners will face difficulties, not only in the identification of a UAS as a threat, but in their categorization, and in their reaction to this threat. Blame is not easily attributable and debates exist over the possibility of UAS overflight as an act of war. Even if the owner of the UAS is identified, the geographical dislocation of the owner may prevent or at least complicate the possibility of retaliation. Questions exist in terms of proportionality when retaliating. Military planners must now expect to face a more situationally aware and information enabled adversary than ever before as UAS proliferation has placed this technology in the hands of possible adversaries not previously enabled as such. Military planners must also engage in more rigorous perception management or public affairs campaigns given the ethical opposition to the employment of UAS. The public now expects that collateral damage be reduced by the precision afforded by UAS technology, making targeting more cumbersome and time consuming while simultaneously our adversaries remove links from the kill chain. Finally, UAS proliferation has

given birth not only to the “tactical General” but also to his mother or father, the “tactical President, Prime Minister, or Chancellor”. All of these changes have fundamentally changed the way in which military planners must now, and in the future, plan operations.

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