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THE NEXT HORIZON: THE FUTURE OF UNMANNED AIRCRAFT SYSTEMS IN THE CANADIAN ARMED FORCES

Lieutenant-Commander Greg Zuliani

JCSP 45

Exercise Solo Flight

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INTRODUCTION

The introduction of any new and potentially disruptive technology into the military incurs a level of uncertainty and raises important policy questions that must be answered. Recent trends have driven the relocation of the war fighter from the battlefield to the increased safety of a remote location. This gave rise to the increased use of remotely piloted systems (RPS), which are "...important tools that help remove humans from dangerous situations, and permit operations in severe and inhospitable environments."¹ Employment of these systems for tasks that are often referred to as "dull, dirty, and dangerous" provides benefits that are well understood and documented by our allies and potential adversaries alike.² The Government of Canada (GoC) has recognized the value of potential Canadian Armed Forces (CAF) RPS through the release of *Strong, Secure, Engaged: Canada's Defence Policy (SSE)*, which includes at least six separate initiatives related to RPS.

As a subset of RPS, remotely piloted aircraft (RPA) are no stranger to the battlefield with some of the earliest variants seeing employment almost 30 years ago.³ Recognizing the unique challenges with respect to these systems, the *Canadian Forces UAV Campaign Plan* was released in 2007 to guide the development and growth of this fledgling capability. Of note, although the term unmanned aerial vehicle (UAV) was used at the time, *SSE* now uses the term RPS while the CAF uses both unmanned aircraft (UA)

¹ Department of National Defence, *Strong, Secure, Engaged: Canada's Defence Policy*. (Ottawa: National Defence, 2017), 73.

² Department of National Defence, *UAV Campaign Plan*. (Ottawa: National Defence, 2007), 3.

³ Gary Schaub Jr. "JUSTAS for all?: Innovation and UAVs in the Canadian Forces." *Defence Studies* 15, no. 2 (June 2015): 126.

and RPA. The additional terms unmanned aircraft system (UAS) and remotely piloted aircraft system (RPAS) are used to include the air vehicle as well as the ground control stations, payloads, and all other support equipment needed to operate the system as a whole. Specifically, UA(S) is the overarching term; the RPA(S) designation is a subset of UA(S) that refers only to the largest and most capable aircraft/systems.⁴ For consistency, this paper will use the CAF terminology. The campaign plan was intended to serve as the roadmap to develop UAS capabilities within the CAF over an initial three year period and laid the groundwork for further development beyond that.⁵ The intention was to update the document on an annual basis. However, the document has not received further updates and given the rapid pace of technological advancement in this field, its relevance is now suspect.

This paper will examine some of the policy requirements surrounding the introduction of UAS into the CAF with a view to identifying any shortfalls or seams that require addressing. In short, it aims to summarize where the CAF started, where the CAF is currently, and where the CAF is going next. Initially it will look into the intent of the *Canadian Forces UAV Campaign Plan*. This will provide the context regarding the establishment of UAS capabilities in the CAF. Secondly, the paper will examine the current state of policies governing UAS within the CAF. This section will include recent initiatives in *SSE* and serve to identify current issues facing the introduction of UAS. The final section will explore the future legal considerations of lethal autonomous weapons systems (LAWS) and how these considerations will likely affect the employment of UAS

⁴ Department of National Defence, *Uninhabited Aircraft System (UAS) Terminology*, CANFORGEN 082/17, 021253Z MAY 17.

⁵ Department of National Defence, *UAV Campaign Plan*...,18.

in the CAF. In an effort to better understand where the CAF intends to go, it is useful to first understand where the CAF began.

A BRIEF HISTORY OF UAS IN THE CAF

Well before the *UAV Campaign Plan* was drafted, the RCAF was exploring how to best introduce UAS to the fleet. In late 2000, the Joint Unmanned Target Acquisition and Surveillance System (JUSTAS) Project was initiated to acquire medium altitude long endurance (MALE) UAS.⁶ At the time of this writing, the project has undergone a name change to the Remotely Piloted Aircraft System (RPAS) Project and is expecting initial delivery in the 2024-2025 timeframe.⁷ Some of the reasons for the delays are beyond the scope of this paper and directly related to the procurement process in Canada; however the remainder of the issues will be addressed later on when examining the current state of UAS policies in the CAF.

The challenges facing the CAF when the *UAV Campaign Plan* was drafted were distinctly different than those facing the CAF today. Notably, the CAF was still operating in Afghanistan in support of the NATO-led International Security Assistance Force (ISAF).⁸ The difficult lessons learned through operations in Afghanistan had shaped the ways in which the CAF viewed the relevance of UAS capabilities. Initially deploying with a lack of organic UAS, the CAF soon realized the impact of this capability gap.⁹ Accordingly, an urgent operational requirement was raised and fast-tracked the

⁶ Gary Schaub Jr. "JUSTAS for all? ...", 129

⁷ Department of National Defence. "Defence Capabilities Blueprint: Remotely Piloted Aircraft System (RPAS) Project." Last accessed 24 April 2019. <http://dgpapp.forces.gc.ca/en/defence-capabilities-blueprint/project-details.asp?id=977>

⁸ National Defence and the Canadian Armed Forces. "Archived- Canadian Forces Operations in Afghanistan." Last accessed 24 April 2019. <http://www.forces.gc.ca/en/news/article.page?doc=canadian-forces-operations-in-afghanistan/hnps1u1p>

⁹ Department of National Defence, *UAV Campaign Plan*..., 21.

acquisition and fielding of the CU-161 *Sperwer* in 2003.¹⁰ While ultimately successful, the CAF realized that “...the rapid acquisition and deployment of the system was not an optimal process.”¹¹ A more deliberate and planned approach was needed for future acquisitions.

THE CAF UAV CAMPAIGN PLAN

The stated aim of the plan was straightforward “...to formulate a coherent CF [sic] investment strategy for the acquisition and operation of a “family of UAVs’.”¹² As the document was drafted by the Chief of Force Development (CFD), the goal of a singular joint strategy for acquisition and operation makes complete sense. This reduces the potential for inter-service rivalries and quarrels about priority for resource allocation. The document was drafted to ensure alignment, minimize duplication of effort, and maximize efficiencies between the various element force development staffs. Moreover, it also ensured alignment with the *Canada First Defence Strategy (CFDS)*, which identified unmanned aircraft as a significant contributor of the “...surveillance ‘system of systems’....”¹³

The plan sequenced capability priorities into three categories; near, mid and long term. The near-term priorities, between 2007 and 2009, were largely driven by the immediacy of the ongoing conflict in Afghanistan while continuing to support the employment of the *Sperwer*. By this point, *Sperwer* had been operating for almost four years in theatre and there was little chance of the CAF relinquishing the increased intelligence, surveillance, target acquisition, and reconnaissance (ISTAR) deliverables that had made “...these types of systems...essential to deployed CF forces.”¹⁴ In addition to the *Sperwer*, the smaller *ScanEagle* was acquired through a contracted lease agreement and rapidly

¹⁰ Gary Schaub Jr. “JUSTAS for all? ...”, 129-130.

¹¹ Department of National Defence, *UAV Campaign Plan...*, 34.

¹² *Ibid*, 18.

¹³ Department of National Defence, *Canada First Defence Strategy*. (Ottawa: DND, 2008), 18.

¹⁴ Department of National Defence, *UAV Campaign Plan...*, 21.

deployed to theatre in June of 2008.¹⁵ It was this same *ScanEagle* contract that would serve to open the door for the Royal Canadian Navy (RCN) to operate UAS from ships at sea.

Leveraging the existing contract and drawdown of forces in Afghanistan, the RCN employed the *ScanEagle* from HMCS *Charlottetown*, *Toronto*, and *Regina*.¹⁶

The procurement and fielding of miniature UAS was also identified as a near-term priority. Smaller than the *Sperwer* and *ScanEagle*, these relatively simple systems were ideal for the tactical level troops in theatre and offered the benefit of being “...easy to operate, integrate, maintain, and repair and their payloads can be rapidly changed.”¹⁷ Furthermore, the responsibilities for collective training, force generation, and force employment of these small and miniature systems, at the time referred to as a Tier Three, were delegated to the environmental commanders.¹⁸ The focus on these two near-term priorities ensured current operations were being supported adequately and also served to lay the groundwork for the Canadian Army (CA) to fully integrate miniature UAS over the coming decade. The CA would operate numerous small and miniature UAS during the conflict in Afghanistan including the *Maveric*, *Skylark*, and *ScanEagle* with mixed results.¹⁹ However, the lessons learned and experiences gained during this time were instrumental in enabling the CA to fully integrate the *Raven B* UAS into service by 2014.²⁰

The mid-term priorities were laid out for the following two to five years from 2009 to 2012. These priorities focussed on the requirement for beyond line of sight (BLOS) UAS

¹⁵ National Defence and the Canadian Armed Forces. “Archived- Strengthening the Canadian Forces and Canadian Sovereignty.” Last accessed 25 April 2019. <http://www.forces.gc.ca/en/news/article.page?doc=strengthening-the-canadian-forces-and-canadian-sovereignty/hnps1tx7>

¹⁶ Royal Canadian Navy. “RCN Experimenting with Unmanned Capabilities at Sea.” Last Accessed 25 April 2019. <http://www.navy-marine.forces.gc.ca/en/news-operations/news-view.page?doc=rcn-experimenting-with-unmanned-capabilities-at-sea/ivxn59ye>

¹⁷ Department of National Defence, *UAV Campaign Plan...*, 21.

¹⁸ *Ibid*, 24.

¹⁹ Gary Schaub Jr. “JUSTAS for all? ...”, 134.

²⁰ *Ibid*.

capabilities to first support overland operations, followed by support to maritime and Arctic operations.²¹ This priority spoke to the utility of UAS with longer endurance and further range than the small and miniature UAS being employed by the CAF at the time. Although not specifically named in this section, there was also an expectation that JUSTAS would be delivered in the same 2009/10 timeframe, and would likely serve to fill these requirements.²² Coincidentally and unbeknownst at the time of drafting, this mid-term period also lined up with the release of the *Independent Panel on Canada's Future Role in Afghanistan*, also known as the Manley report.²³

The panel undertook a fulsome review of Canada's role in the Afghanistan conflict and made a series of recommendations regarding the way forward. However, one particularly notable recommendation from the panel was that Canada "... should also secure medium helicopter lift capacity and high-performance Unmanned Aerial Vehicles (UAVs) for intelligence, surveillance, and reconnaissance before February 2009."²⁴ This report was released in January of 2008, leaving little over a year for the CAF to procure and field new UAS to support combat operations in Afghanistan. Given the protracted procurement process in Canada and the aggressive schedule put forward by the panel, the CAF turned to a contracted MALE UAS solution in the CU-170 *Heron*.²⁵ This contract was based on a two year period with an option for a third year and was delivered into theatre in January of 2009,

²¹ Department of National Defence, *UAV Campaign Plan...*, 22.

²² *Ibid*, 35.

²³ Government of Canada, *Independent Panel on Canada's Future Role in Afghanistan*. (Ottawa: PWGSC, 2008).

²⁴ *Ibid*, 38.

²⁵ National Defence and the Canadian Armed Forces. "Archived – Canada Increases Air Capabilities in Afghanistan." Last accessed 24 April 2019. <http://www.forces.gc.ca/en/news/article.page?doc=canada-increases-air-capabilities-in-afghanistan/hnps1tld>

meeting the aggressive schedule and arriving in theatre before the retirement of the *Sperwer* in April of 2009.²⁶

The longer-term priorities were focussed on the next five to ten years between 2012 and 2017. These were understandably less tangible and instead drove the continued research and development of UAS technologies while best positioning the CAF to integrate and harness these capabilities in the future.²⁷ Expanded upon further in the plan, this priority speaks to the organizational structures required for future UAS employment as well as the tactics, techniques, and procedures that will need to be developed as these technologies continue to evolve. The plan establishes the framework for working groups, a UAS Joint Program Office, airworthiness authorities, and research and development programs related to UAS.²⁸ Ultimately, the goal of this priority was to ensure that the CAF was able to continue to exploit UAS in the future and build on the successful deployments thus far.

EXPECTATIONS VERSUS REALITY

Two years after the release of the *UAV Campaign Plan*, UAS capabilities in the CAF had come a long way and were relatively on track to deliver the capabilities as laid out by the priorities. The immediate requirements of soldiers on the ground had been met through the procurement of small and miniature UAS as noted above, and mid-term requirements were being realized through contracted support. The plan had policy coverage within the *CFDS* and was meeting the recommendations of the Manley report with respect to UAS. The next steps were clearly evident as the JUSTAS program progressed through the procurement process and would deliver a permanent UAS capability to Canada. So what happened?

²⁶Danny Garrett-Rempel. "Will JUSTAS Prevail? Procuring a UAS Capability for Canada." *Royal Canadian Air Force Journal* 4, no. 1 (Winter 2015): 19-31.

²⁷ Department of National Defence, *UAV Campaign Plan*..., 22.

²⁸ *Ibid*, 26-30.

One of the major contributing factors influencing UAS procurement during this time was the increasing invocation of an urgent operational requirement (UOR) to justify sole-source contracts that would expedite delivery. These UORs were valid and substantiated by the conditions facing the CAF in combat operations. However, the Auditor General at the time, Sheila Fraser, disagreed and "...publicly questioned the government's decision to purchase billions of dollars of military hardware over the last year without any competition."²⁹ At the same time, the JUSTAS Project had submitted a sole-source proposal to procure *Predator* UAS from the US. The timing worked against the project and proved politically unpalatable for the Harper government.³⁰ Ultimately, the sole-source proposal was cancelled and the project was sent back to follow the standard competitive procurement process.

In addition to this setback, the CAF was also nearing the end of combat operations in Afghanistan. Both the *Heron* and *ScanEagle* were in theatre and providing ISTAR effects for the CAF, so the immediacy of delivering JUSTAS was minimized. The *Heron* would remain in theatre until the end of combat operations in Afghanistan and the contract was not renewed.³¹ As noted above, the *ScanEagle* contract was assumed by the RCN. The two factors coincided to have a net negative effect on the future of UAS development in the CAF. The drawdown of combat operations and the hesitation to pursue sole-source contracts both served to stifle the enthusiasm behind the *UAV Campaign Plan*. Essentially, the first two capability priorities had been met through the Afghanistan years, but any appetite for further spending on UAS had been suppressed for the time being.

²⁹ David Pugliese "Tories kill sole-source DND contract; \$500-million deal for aerial drones from U.S. firm cancelled over optics." *The Ottawa Citizen*, 20 April 2007.

³⁰ *Ibid.*

³¹ Danny Garrett-Rempel. "Will JUSTAS Prevail?..."

Instead of a cohesive and joint approach, each element started to focus independently on separate projects; the CA was pursuing miniature and small UAS, the RCN had its immediate requirements met by *ScanEagle*, and the RCAF was attempting to get JUSTAS back on track after a significant setback. Over the previous years, the lessons learned had been captured and UAS were recognized to have "...all contributed to the safety and success of the CAF by acting as a force multiplier that supplied crucial around-the-clock ISR capability."³² However, an election was now just months away and the uncertainty associated with a possible new government added yet another layer of complexity to the situation.

CURRENT DEFENCE POLICY

Although the years following the withdrawal from Afghanistan saw the elements pursuing separate initiatives, organizational structures had previously been put in place to enable liaison between the respective force development staffs. The CAF UAS Working Group (CAF UAS WG) was established and acted to maintain a shared situational awareness between the elements and promote information sharing.³³ Attempts to align the RCN acquisition of a small UAS with the CA's acquisition of the *BlackJack* ultimately failed based on space availabilities onboard the *Halifax*-class frigates. However, the liaison between elements was established to ensure co-ordination of requirements such as NATO Standardization Agreements (STANAGs) were common among separate projects.³⁴ By 2015, the *UAV Campaign Plan* had essentially reached the end of its intended life and had yet to receive a single update. The election of the Trudeau government in 2015 also ushered in the Defence Policy Review (DPR) which led to the

³² Danny Garrett-Rempel. "Will JUSTAS Prevail?..."

³³ The CAF UAS WG normally sat twice a year. As the project director for RCN ISTAR UAS, I was invited to attend and update stakeholders on the status of the project.

³⁴ Department of National Defence, *UAV Campaign Plan...*, 41.

release of *SSE*, which would supersede the previous direction found in *CFDS*.³⁵ Policy changes were certainly on the horizon, but the way in which they would lead the CAF remained unknown.

One indicator as to the direction that the CAF would be following came directly from the Chief of Defence Staff (CDS) in an interview with CBC where he stated “In my view there's little point to having a UAV that can see a danger but can't strike it if it needs to.”³⁶ In the same interview, he also indicates that the JUSTAS project would receive increased priority, and acknowledged the potential for debate surrounding armed UAS. This direct and public support of the JUSTAS project was a marked departure from the previous narrative surrounding the project since the setback in 2009. It also served to encourage public discourse regarding the use of armed UAS by the CAF and set the conditions for inclusion of this capability within *SSE*.

The release of *SSE* presented the CAF with concrete initiatives that were fully funded and provided the policy coverage to progress various UAS projects. The RCN was directed to “acquire new or enhanced naval intelligence, surveillance, and reconnaissance systems....”³⁷ The RCAF was directed to “invest in medium altitude remotely piloted systems.”³⁸ In addition, *SSE* included an entire section that detailed the GoC’s desire to exploit remotely piloted systems including procuring armed aerial systems, conducting research and development of RPS alongside academia and industry,

³⁵ Government of Canada. “Defence Policy Review.” Last accessed 25 April 2019. <http://dgpaapp.forces.gc.ca/en/defence-policy-review/index.asp>

³⁶ Canadian Broadcasting Corporation. “Canada should buy drones that can strike as well as see, says Jonathan Vance.” Last accessed 25 April 2019. <https://www.cbc.ca/news/politics/vance-canada-armed-drones-1.3480278>

³⁷ Department of National Defence, *Strong Secure Engaged...*, 35.

³⁸ *Ibid*, 55.

and also investigating legal requirements surrounding the employment of these systems.³⁹ This single document immediately clarified the GoC's intent and breathed new life into projects that had been stagnating. This renewed interest also revived a number of policy questions that remained unanswered or required revisiting.

OUTSTANDING POLICY QUESTIONS

What may seem like one of the initial questions that a project should ask when procuring an aircraft also happens to be one of the more difficult questions to answer. Who are the intended operators of the UAS? Will these systems be flown by qualified pilots, or is the intent for each service to own and operate these systems organically with their own members? Unfortunately, the answer to these questions is: it depends. Previous employment of UAS avoided these questions either through the use of contracted operators in the case of *ScanEagle*, or qualified pilots in the case of the *Heron*.⁴⁰ Miniature UAS were operated in accordance with the direction provided in the *UAV Campaign Plan* that environments would force generate their own operators for these systems.⁴¹ However, this previous direction would also come under increased scrutiny as the capabilities of the small and miniature UAS continued to increase and expand.

In a letter to the Vice Chief of Defence Staff (VCDS) and Commanders of the RCN, CA, and Special Operations Forces Command (SOFCOM), the Commander of the RCAF outlined some of his concerns with the operation of these class 1 UAS.⁴² Essentially, the pace of technological advances from the release of the *UAV Campaign Plan* invalidated some of the initial assumptions. Small UAS are now capable of

³⁹ *Ibid*, 73.

⁴⁰ Gary Schaub Jr. "JUSTAS for all? ...", 133-134.

⁴¹ Department of National Defence, *UAV Campaign Plan*...,18.

⁴² Michael J. Hood. *New Class I Unmanned Aircraft Systems (UAS) - Airworthiness Regulation and Operation Concerns*. Commander Royal Canadian Air Force: file 3000-8 (DAR), 17 August 2016.

operating in airspaces that previously only larger UAS would be operating in. The larger UAS were always intended to “...have been operated by wings-qualified officers, proficient in civil and battlefield airspace regulations...”⁴³ The term wings-qualified refers to officers of either the pilot or air combat system operator (ACSO) trade in the RCAF. Additionally, the letter raises concern with the intention “...to use Artillery/Infantry Non-commissioned members as operators, which may not meet the stringent training and qualification requirements normally met by professional aviators.”⁴⁴

These concerns are currently being worked on through the efforts of the Joint Operator Training Project (JOTP). However, there is no easy solution to this wicked problem. The RCAF is currently facing a pilot shortage; any additional demand for pilots for UAS is sub-optimal.⁴⁵ So much so that the Commander of the RCAF “...directed staff to look at using other air operations officers to perform operations tasks, keeping qualified pilots focussed on flying.”⁴⁶ Perhaps ACSO will be the preferred trade for UAS operators in the CAF. Similar pressures will likely be felt amongst the aircraft maintainers and technical staffs assigned to the UAS portfolio.

The Commander of the RCAF is the airworthiness authority (AA) for the CAF and is responsible for all aspects of Airworthiness on behalf of the Minister of National Defence. Prior to any amendments, anything that was flown by CAF members required a full release to service through the airworthiness program. Recognizing the desire to

⁴³ *Ibid.*

⁴⁴ Michael J. Hood. *New Class I Unmanned Aircraft Systems (UAS)*...

⁴⁵ Canadian Broadcasting Corporation. “Canadian Air Force Short 275 Pilots as Attrition Outpaces Recruitment, Training.” Last accessed 25 April 2019. <https://www.cbc.ca/news/politics/air-force-pilots-short-1.4827862>

⁴⁶ Royal Canadian Air Force. “Managed Shortfall.” Last accessed 25 April 2019. <http://www.rcaf-arc.forces.gc.ca/en/article-template-standard.page?doc=managed-shortfall/jg2k237m>

increase the use of small, commercially available UAS by various CAF organizations, the AA conducted a review and rationalization of the airworthiness program for these small UAS. As such, a new category of small UAS was created; the open category. A number of restrictions were placed on this category including where and when the UAS could be flown, the maximum weight of the UAS, and what training would be required.⁴⁷ This allowed organizations like Public Affairs and Combat Camera to receive appropriate training and minimize risks to personnel while simultaneously meeting the desire for increased usage of these types of UAS for mostly non-operational tasks.

This open category designation was a step in the right direction for policies regarding the use of UAS in the CAF. However, the scope was restricted to small UAS with limited capabilities. While it is understandable to introduce policies in a “crawl, walk, run” fashion, one of the fundamental reasons behind the policy change still remains unsolved. The policy was brought about to reduce the strain on the airworthiness program and expedite airworthiness clearances.⁴⁸ As the CAF continues to procure additional UAS, the systems will also place a strain on the airworthiness program. Granted, large aircraft such as the *Predator* and *Global Hawk* will likely require a full airworthiness clearance based on their size and potential usage in or around civilian airspace. Smaller systems that will not be operating in civilian airspace and are much less complex should not be required to follow the same process as a manned aircraft. The burden of completing a full airworthiness clearance process only serves to delay fielding of these systems; a level of clearance that is tailored for UAS is required as soon as possible. While these two concerns may be the most time-sensitive as more and more UAS are

⁴⁷ Department of National Defence, *DND/CAF Airworthiness Reqr for Class 1 Open UAS*, CANFORGEN 118/18, 131935Z JUL 18.

⁴⁸ Department of National Defence, *DND/CAF Airworthiness Reqr for Class 1 Open UAS...*

introduced into service, there are also longer-term concerns that the CAF must begin to take into consideration.

FUTURE CONSIDERATIONS

Discussions regarding the legality and morality of lethal autonomous systems are not unique only to autonomous UAS. NATO expert in this field, J.S. Thurnher reminds us that similar discussions were being held surrounding the introduction of the Close-In-Weapons-System (CIWS) in the 1970s.⁴⁹ Since that time, CIWS have become standard on any modern naval warship. Many missile systems like the *Halifax*-class's *Harpoon* surface to surface missile have internal tracking and guidance with no ability to alter or self-destruct the missile once fired. More recently, the combat management system (CMS 330) onboard the *Halifax*-class frigate has also been upgraded to include the ability to automatically defend the ship from threats. In this regard, it is important to differentiate exactly what is meant by "autonomous".

Agreement on such a definition is no easy task, even more so in a joint, combined, multinational environment such as NATO or the United Nations. However, the International Committee of the Red Cross has offered the following definition "Any weapon system with autonomy in its critical functions—that is, a weapon system that can select (search for, detect, identify, track or select) and attack (use force against, neutralize, damage or destroy) targets without human intervention."⁵⁰ This definition is useful as it separates two distinct operational functions that must be performed; sense and

⁴⁹ Jeffrey S. Thurnher. "Means and Method of the Future: Autonomous Systems." in *Targeting: The Challenges of Modern Warfare*. The Hague, Netherlands: Asser Press (Springer), 2016, 177-199.

⁵⁰ Neil Davison. "A legal perspective: Autonomous weapon systems under international humanitarian law." Last accessed 1 May 2019: https://www.icrc.org/en/download/file/65762/autonomous_weapon_systems_under_international_humanitarian_law.pdf

act. As pointed out by LCol Haider from NATO's Joint Air Power Competence Centre; "...everything necessary to build a fully automated weapon system is already developed. The respective technologies merely have to be brought together."⁵¹ Is it this marriage of technology that now raises additional legal and ethical questions?

Modern anti-autonomous weapons activists have gathered together under the banner of the "Campaign to Stop Killer Robots" with a view to "Retain meaningful human control over targeting and attack decisions by prohibiting development, production, and use of fully autonomous weapons."⁵² The group has many members worldwide and is an important voice in the debate surrounding the future use of autonomous weapons. However, as explicitly detailed by Thurnher's piece, the systems themselves should not be seen as illegal under either the Geneva Conventions or customary international laws. They are neither indiscriminate, such as a unguided cluster bomb, nor do they cause inhumane or unnecessary injuries similar to weapons containing glass shrapnel that is undetectable by medical workers.⁵³ Furthermore, the application of these weapons would also be governed by the Law of Armed Conflict, as all weapons used by the CAF are. While the application of these weapons is slightly more complex with autonomous weapons, the principles of distinction, proportionality, and minimizing harm to civilians can also be met through programming and pre-mission operator inputs.

A more fulsome examination of the legality and ethical questions surrounding LAWS could be the basis for an entirely separate paper on its own. Regardless, the debate surrounding their introduction is important and should be monitored by the CAF

⁵¹ LCol Andre Haider. "Autonomous Weapons Systems in International Human Law" *Transforming Joint Air and Space Power, The Journal of the JAPCC*. 27, (Autumn/Winter 2018): 46.

⁵² Campaign to Stop Killer Robots. "The Threat of Fully Autonomous Weapons." Last accessed 1 May 2019: <https://www.stopkillerrobots.org/learn/>

⁵³ Thurher, 186-197

as these systems continue to develop. Maintaining awareness of the current state of the debate both in NATO and the Canadian context will better position the CAF to make informed policy decisions regarding the eventual introduction of LAWS.

MODEST RECOMMENDATIONS

Given the past successes of the *UAV Campaign Plan*, it is recommended that this document be reviewed for relevance, updated, and re-issued under the lead of the RCAF. Naturally, this should not be done in isolation as the perspectives of the RCN, CA, and CANSOFCOM are vitally important to ensure the document adequately captures their unique requirements. Given the emphasis placed on the development and acquisition of RPS in *SSE*, a cohesive and deliberate plan to achieve this must be produced and disseminated to the CAF stakeholders.

Concurrently, priority should be placed on the efforts of the JOTP in identifying the requirements for UAS operators for all classes and the appropriate training solutions. Without this, there exists the potential to acquire UAS without the appropriate standards in place to adequately train the intended operators. Before training the operators, the decision must be made as to what qualification those operators must possess. Given their extensive experience with the *Raven-B* and *BlackJack*, the CA's training centre should not be sidelined or overlooked during these discussions. Similarly, the RCN and CANSOFCOM are gathering experience operating the *Puma*, and should be consulted accordingly throughout the process.

Lastly, although LAWS have not yet fully matured to operational systems, they are continuing to develop and will unavoidably become a reality on the battlefield. The CAF should strive to not only participate in international forums and conferences, but to

take a leadership role in the development of international regulations and laws to govern these systems. This is fully aligned with the intent of *SSE*, and Canada is well positioned in this regard due to our valued status in NATO and the United Nations. Furthermore, as noted by the CDS in his interview regarding armed UAS, Canada and the CAF must prepare for the integration of armed UAS into operations. UAS with precision strike capabilities will be delivered through the RPAS project, and the CAF must ensure that all legal, public affairs, and policy concerns are alleviated prior to delivery. Failure to do so has the potential to negatively impact the introduction of this much needed capability.

CONCLUSION

The aim of this paper was to examine the policy requirements surrounding the introduction of UAS into the CAF with a view to identifying shortfalls and seams that require addressing. It began by looking at the origins of UAS employment in the CAF and examining the context in which those early UAS were acquired and operated. The origins of the RPAS project were traced back to late 2000. Additionally, the influence of the conflict in Afghanistan and requirement to support combat operations was identified as one of the driving factors behind the rapid acquisition and leases of UAS at the time. After meeting the initial requirements, the *UAV Campaign Plan* was released to set the CAF on a more deliberate path to acquire and operate UAS.

The paper explored the *UAV Campaign Plan*, and assessed the effectiveness of the capability priorities set out in the document. Overall, the short and mid-term priorities were achieved and represented significant advances for the employment of UAS in the CAF. Follow on priorities with respect to establishing the foundation for UAS operations in the CAF were less successful and ultimately were not entirely met. With the

withdrawal from Afghanistan and an election around the corner, enthusiasm for UAS within the CAF began to wane until the release of *SSE* and a renaissance with respect to remotely piloted systems in general, and UAS specifically.

The renewed interest in the RPAS project, as a named initiative in *SSE*, and the concurrent desire by the RCN and CA to operate larger and more complex UAS conspired to act as a forcing function for the RCAF to update portions of the extant UAS policy. Operator qualifications and standards were questioned by the Commander of the RCAF in response to the changing nature of UAS operations and in light of the ongoing pilot shortage. Furthermore, the airworthiness requirements surrounding the smallest class of UAS were relaxed and delegated to environmental commanders, lessening the burden on RCAF airworthiness program. While these steps were undoubtedly required and definitely welcome, further work in these fields remains to be done.

Next, the paper examined one of the potential issues surrounding the introduction of LAWS by the CAF. Noting the similarities between LAWS and some of the systems already being employed by the CAF, many of the concerns raised by activist groups may turn out to be largely unfounded. However, this does not release the CAF from remaining engaged in the issue and maintaining situational awareness as to the current state of debate surrounding LAWS. *SSE* also specifically directs the CAF to become involved in the development of international laws and norms surrounding these systems.

Finally, recommendations were made as to where the priority of effort should be focused on the policy issues facing UAS in the CAF. First and foremost, an updated campaign plan is required to ensure cohesion and minimize duplication of effort.

Secondly, the JOTP must be assigned priority such that the operator qualifications can be established and appropriate personnel are in place before further UAS are delivered to the CAF. Finally, the CAF must continue to develop subject matter experts with respect to the introduction of LAWS. While the legal issues may turn out to be uncomplicated, the management of messaging and public opinion will require a CAF that is well versed in all aspects of the conversation surrounding the issue.

Overall, the CAF is well positioned to continue the development and implementation of UAS. With an updated plan and slight modification of priorities, the individual elements will be better able to support a CAF-wide vision of how UAS will be implemented. It has been said that while history does not necessarily repeat itself, it has the tendency to rhyme. If the past is any indication, a coherent plan and willing force development staff will be more than enough to enable the CAF to maximize the potential benefits that UAS bring to the fight.

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