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The Implications of the US Third Offset Strategy for the RCAF of the Future

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Scientific Letter

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Introduction

This paper has been written in response to a request by the Commanding Officer of the Canadian Forces Aerospace Warfare Centre (CFAWC) for suggested areas of investigation into technological change affecting air power and the Royal Canadian Air Force (RCAF) of the future. It must be stressed that CFAWC's longer term mandate to provide detailed functional and enabling concepts arising from its Future Air Operating Concept (FAOC) will provide this necessary guidance.[1] However, until such time as those functional and enabling concepts are developed, the Operational Research and Analysis Branch (OR&A) recommend using those areas the United States (US) is exploring in its Third-Offset Strategy—understood in the context of the recent Canadian Defence Policy *Strong, Secure, Engaged* (SSE)—as a guide to do so. The US will remain Canada's key defence ally in both continental and international operations, and how the RCAF evolves to remain a credible partner will be driven by the evolution of the American conception of air power, and air and joint operations.

Background

The past sixteen years of sustained and expensive military operations in the Middle East and Afghanistan has taken its toll on the US in physical and financial terms, and seems to have affected its willingness to be the *de facto* lead in all contingency operations around the world. While they still possess the most advanced military on earth, and that will remain so for the foreseeable future, the gap is beginning to narrow with the advent and proliferation of disruptive technologies aimed at the pillars of US power projection and the military advantage it has enjoyed since the end of the Cold War. These technologies have been used to form advanced anti-access/area denial (A2/AD) environments that present the United States with an unenviable strategic choice—either risk the loss of access to vital areas by ceding control to adversaries, or develop the means to counter these strategies through investments in capabilities at a time of fiscal austerity. The US is pursuing the latter course through, *inter alia,* the development of its Third Offset Strategy.

[1] See Brad Gladman, Bruce Chapman, and Andrew Billyard, *The Development of a Future Air Operating Concept: Proposed Process and Example* (Ottawa: DRDC-RDDC-2017-R043, 2017), 42–50; Royal Canadian Air Force, *Future Concepts Directive Part 2: Future Air Operating Concept* (Ottawa, 2017), 1.

Since the end of World War II, the United States has faced periods when addressing existential defence challenges whilst confronted with a need to restrain defence spending. The first occurred in the opening years of the Cold War during the presidency of Dwight D. Eisenhower, and is considered the First US Offset strategy. His desire was to ensure an appropriate level of military preparedness, but one which could be sustained without crippling the US economy. Eisenhower shrewdly realised that the Cold War would be as much about economics as military strength, and his preference was to find a way to meet defence requirements at a reduced level of expenditure.[2] Central to Eisenhower's *New Look* national security policy, formalised by National Security Council 162/2 signed in October 1953, was the concept of massive retaliation using nuclear weapons as a cost-effective way to counter the numerical superiority of the Soviet (and later the Warsaw Pact) military.[3] Nuclear weapons did not replace conventional forces, and the strategy also called for a reduction in the risk of Soviet aggression through "a strong security posture…[and] ready forces of the United States and its allies suitably deployed and adequate to deter or initially to counter aggression".[4] Specifically, it sought to use increasingly numerous and varied nuclear weapons with long-range delivery systems, combined with passive and active defences to offset Soviet numbers.[5] This *New Look* policy was thus balanced, sought to complicate enemy freedom of manoeuvre and defence planning through the use of technology as a force-multiplier, and offered flexible response options that enhanced deterrence and enabled throwing American and allied strength against enemy weakness. It also emphasised covert operations to achieve national security aims, and stressed the importance of allies for burden-sharing, all to complicate an adversary's operational planning and impose unbearable costs upon them.[6] In the end, this strategy enabled Eisenhower to contain the Soviet Union and reduce the defence budget by forty percent between the fiscal years of 1952 and 1956.[7]

The Second Offset strategy began in the 1970s under US Defense Secretary Harold Brown and his deputy, William Perry, when the US invested wisely in new technologies and capabilities. In particular, the investment in stealth aircraft, extended-range precision-guided munitions, and new intelligence, surveillance, and reconnaissance platforms and systems were the key to the Air Land Battle doctrine used to great effect in the First Gulf War in 1991. They have also "anchored America's military superiority during the post-Cold War era."[8] As with the First Offset strategy, the Second demonstrated that technology can serve as a potent force-multiplier, offsetting the numerical advantage "of a larger, but technically inferior force."[9] This strategy again aimed at putting US and allied strength against enemy weakness using technological

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[2] Donald C. Story and Russell Isinger, "The Origins of the Cancellation of Canada's Avro CF-105 Fighter Program: A Failure of Strategy", 1030.

[3] Dwight D. Eisenhower Presidential Library (DDE), Papers as President of the United States, 1953–61, Ann Whitman file, Memorandum "Discussion at the 225th Meeting of the National Security Council", 24 November 1954"; DDE White House Office, Office of the Special Assistant for National Security Affairs: Records, 1952-61, Box 9, NSC 5408 – Continental Defense (1), Draft Statement of Policy Proposed by the National Security Council on Continental Defense, General Considerations, 7; Library of Congress (LC) Papers of Curtis E LeMay, Box 194, Letter from MGen Gerhart, Special Assistant to the Joint Chiefs of Staff for National Security Affairs, to General LeMay, 14 January 1954.

[4] DDE, National Security Council Staff Papers, Disaster File, box 11 (NSC 162/2), "A Report To The National Security Council by The Executive Secretary on Basic National Security Policy", 30 October 1953, 19.

[5] Robert Martinage, "Toward a New Offset Strategy: Exploiting U.S. Long-Term Advantages To Restore U.S. Global Power Projection Capability," *Center for Strategic and Budgetary Assessments* (2014), 2.

[6] *Ibid.,* 13.

[7] Zachary Keck, "A Tale of Two Offset Strategies," *The Diplomat* (18 November 2014), http://thediplomat.com/2014/11/a-tale-of-two-offset-strategies/ (accessed 26 July 2017).

[8] *Ibid.*

[9] Martinage, "Toward a New Offset Strategy," iv.

advantage "to shape the competition, shifting it into areas advantageous to the United States."[10] At the same time, the maintenance of a credible deterrence through strong conventional forces augmented the effect of considered investment in leading edge technologies. At least as important was "strategic continuity and institutional commitment. While DoD initiated several technology development programs in the late 1970s, they never would have been fielded if not for enduring bureaucratic support for them within the Pentagon, in successive White House administrations, and on Capitol Hill."[11] That reality has not changed.

It is apparent that the previous administration's crafting of a Third Offset strategy will endure, although likely under a new moniker for the new administration. The simple fact is that the US near monopoly in precision-strike ushered in by the second offset strategy is beginning to slip away. Potential adversaries have developed their own reconnaissance-strike brands and integrated air and missile defences, and can now challenge the pillars of US power projection—notably the in-theatre bases, aircraft carriers and other surface combatants, non-stealthy aircraft that are now vulnerable to modern integrated air defence systems, and the kinetic and non-kinetic threats to its network of satellites. It is also clear that these developments are a serious threat to US interests, increasing instability and reducing the deterrent value of US and allied conventional forces. The response cannot simply be escalating its current set of joint capabilities, but rather the US and its allies must leverage their advantages in long-range and stealthy air capabilities and undersea warfare, along with increasing investment in automated unmanned systems and focusing on "complex system engineering and integration in order to project power differently."[12] Investment in these areas would introduce uncertainty about whether adversaries could attain their ends, or at the very least would add significant costs to attempting to do so.

While it is certainly true that technological innovation does not happen in a predictable way, and trying to force it to happen on schedule might see the fielding of capabilities prematurely and at greater cost. However, the continued support at the highest levels for very specific areas of research and development certainly facilitates innovation, and one can argue that it is not possible without it. Some authors, such as Robert Martinage from the Center for Strategic and Budgetary Assessments (CSBA), closely associated with the US Department of Defense's (DoD) Office of Net Assessment (ONA) have attempted to emphasise certain avenues of research and to bring the broad strategic guidance offered by the Third Offset Strategy into sharper focus. It remains to be seen how much this will change under the current US administration, but these avenues are expected to be sufficiently stable to serve as an appropriate guide for allied planning.

One of the more interesting recommendations from the CSBA has been the leveraging of US capability advantages in unmanned systems and automation, extended-range and low-observable air operations, undersea warfare, and complex system engineering and integration into a global surveillance and strike (GSS) network.[13] This GSS network would be balanced with high and low-end capabilities aligned to the spectrum of threat environments, from 'small wars' to advanced A2/AD environments. It would see the US being less dependent on in-theatre bases, less sensitive to enemy air defences, and better able to deal with disruptions to space-based systems. It would provide the level of responsiveness political

[10] *Ibid.,* 17.
[11] *Ibid.*, 16.
[12] *Ibid.*, v.
[13] It is recognised that there is more to the US Third Offset strategy than the GSS. However, the GSS represents a significant air-centric idea. Moreover, given the close association between CSBA and the Pentagon's ONA, the underlying ideas are likely to endure.

leadership has come to expect, with "a credible surveillance-strike presence [that] could be generated within hours-perhaps minutes-of the direction to do so" against targets in multiple locations around the world concurrently.[14]

Like the Air-Sea Battle concept (now known as the Joint Concept for Access and Maneuver in the Global Commons (JAM-GC)), the GSS concept will favour air and maritime forces, and there is much for the air forces of key US allies to consider to ensure they remain credible partners in which US-led or enabled operations they choose to participate. Of particular importance for research and development to enable the strategy and the GSS are[15]:

- [OS 1] Hedge against the loss of space-based enablers by accelerating R&D on alternatives to GPS for precision navigation and timing, fielding a "high-low" mix of unmanned surveillance aircraft with long mission endurance and/or aerial refuelling capability, and developing an "aerial layer" alternative to space for long-haul communications;
- [OS 2] Develop and demonstrate counter-space capabilities to deter prospective adversaries from attacking U.S. satellites;
- [OS 3] Expand the geographic coverage of the undersea fleet by accelerating development of key enabling technologies for unmanned undersea vehicles (UUVs) including high-density energy storage for speed and endurance, undersea navigation and communications, and autonomy;
- [OS 4] Expand undersea payload capacity and flexibility by fully funding the Virginia Payload Module program, accelerating development of seabed payload pods (building on the Defense Advanced Research Projects Agency's (DARPA's) "upward falling payload" program), initiating development of towed payload modules, modifying the Tomahawk land-attack cruise missile and Standard Missile family to address a wider array of target sets, and initiating development of a submarine-launched, conventional ballistic/boost-glide missile;
- [OS 5] Expand geographic coverage provided by fixed and deployable undersea sensor networks;
- [OS 6] Develop and field modern ground-, air-, and sea-deployed naval mines, as well as a long-range anti-submarine warfare weapon;
- [OS 7] Reverse the active defence versus missile attack cost exchange ratio through accelerated development and fielding of electromagnetic rail gun and directed-energy based systems (focused initially on carrier strike group and peripheral base defences);
- [OS 8] Develop and field new counter-sensor weapons including directed-energy systems (e.g., high-power microwave payloads and high-energy lasers) and stand-in jammers/decoys;
- [OS 9] Accelerate fielding of an automated aerial refuelling capability;
- [OS 10] Accelerate development and expand procurement of the Long Range Strike Bomber (LRS-B);
- [OS 11] Develop and field a penetrating, high-altitude, long endurance unmanned aerial vehicles (UAVs) as analogous to the RQ-4 Global Hawk for medium- high threat environments;

[14] Martinage, "Toward a New Offset Strategy," vi.
[15] We retain the list order of the list according to Martinage. As such, we prefix each item with "OS #" to cross-reference with Table 1.

- [OS 12] Develop and field penetrating, air-refuellable land- and carrier-based UCAS platforms (MQ-X and N-UCAS) for geographically distributed surveillance- strike operations (i.e., mobile-relocatable target killers) across the threat spectrum, but especially in medium-high threat environments; and
- [OS 13] Develop expeditionary, ground-based, local A2/AD networks comprising short-to-medium range air defences, coastal defence cruise missiles, defensive mines and UUVs, and mobile surface-to-surface missiles.[16]

Alignment with Canadian Policy

Clearly some of these thirteen initiatives are not directly relevant to the RCAF, although together they do provide a necessary context for discussing the future RCAF. Furthermore, it is important to align these areas of development with the Canadian Government's new defence policy "Strong Secure Engaged" (SSE),[17] while at the same time prioritize the importance of each initiative to the RCAF. To that end, the OR&A conducted a simple prioritization scheme to bring to the top of the list those R&D areas that are most relevant to the RCAF. The research areas were first divided into two bins: those areas that would lead to capabilities which would be owned or managed by the RCAF, and those that would not. The former sets are hereby labelled as "Relevant to the RCAF" and appear in Table 1 (below) with a "Y" under that label. Next, for those which were labelled as "Relevant to the RCAF" the OR&A sought to find where each GSS research area was directly mentioned in the SSE and used the number of times it was directly mentioned as a proxy for importance. Note, this was not a word-count assessment but rather a count of how many times the research area was described or mentioned; hence, summary tables would not be considered if the area was already mentioned in the main body text. The corresponding references in the SSE are provided in Table 1 as evidence to where the research areas were mentioned. Finally, the OR&A conducted a search to find where the SSE either implied the GSS research areas, or where the outcomes of the SSE could be linked to a GSS research area. Again, the number of such references were used as a proxy for the importance of the research area. Table 1 presents these thirteen areas, sorted in order of this priority method.

Table 1: Third Offset Strategy Initiatives, Sorted by Relevance to RCAF and Canadian Defence Policy.

Third Offset Strategy Initiative		Relevant to RCAF	# of direct Defence Policy References	Location	# of indirect Defence Policy References	Location
OS 09	**Automated aerial refuelling**	Y	1	page 39 (#47 "next gen strat air-to-air")	2	page 55 ("Rapid Evolution of Tech.: 2nd para); page 73 (#92 "R&D of remotely piloted…aerial capabilities")
OS 02	**Counter-Space capability**	Y	1	page 71 (2nd last paragraph)	1	page 57 ("disrupt…GPS")

[16] *Ibid.,* vi–vii.
[17] Department of National Defence, *Strong, Secure, Engaged: Canada's Defence Policy* (Ottawa, 2017).

Third Offset Strategy Initiative		Relevant to RCAF	# of direct Defence Policy References	Location	# of indirect Defence Policy References	Location
OS 12	**UCAS**	Y	1	page 73 (#91 "armed aerial system…precision strike")		
OS 01	R&D on GPS alternatives	Y			3	page 39 (#52 "upgrade air navigation"); page 57 ("disrupt…GPS");
OS 11	High altitude UAV in medium-high threat environments	Y			2	page 15 ("next generation surveillance…remotely piloted"); page 73 (#91 "armed aerial system…precision strike")
OS 06	ground/air/sea-deployed naval mines and long-range ASW weapon	Y			1	page 34 ("recapitalizing…the CP-140 Aurora")
OS 07	EM rail gun and DEW	Y			1	page 55 ("Rapid Evolution of Tech.: 2nd para)
OS 08	Counter-sensor weapons, incl. DE and stand-in jammers/ decoys	Y			1	page 71 (3rd last paragraph)
OS 10	Long range strike bomber	Y				
OS 04	Tomahawk Cruise middle and standard missile family	n				
OS 03	UUV	n				
OS 05	Undersea sensor networks	n				
OS 13	Expeditionary, ground-based A2/AD networks for short-medium air defence	n				

Results

Here we find that there are only three initiatives that are directly mentioned in the SSE: automated air-to-air refuelling, counter-space capabilities, and remotely operated drones with strike capability. Next there are five initiatives whose relevance can be gleaned from the Canadian defence policy, but only by inference: alternatives to GPS, high-altitude UAVs in contested environments, air-deployed ASW mines, electromagnetic and directed energy systems, and counter-sensors weapons. Note also that the only RCAF-relevant initiative mentioned in the Third Offset Strategy which cannot be found in the SSE (either directly or indirectly) is the long-range strike bomber. It should also be noted that cyber considerations were not explicitly included in the GSS discussion; however they will play an enabling role in each of the GSS initiatives.

The intention of this document is to serve two purposes. First, in the absence of the completed functional concepts which should be a top priority for the CFAWC, there are three areas of investigation that the RCAF would likely benefit in exploring: automated air-to-air refuelling, counter-space capabilities, and remotely operated drones with strike capability. In doing so, it would be aligning itself not only with its own government's direction but also with a key allied nation's R&D initiatives. It would also provide the intellectual foundation upon which to direct the science and technology (S&T) programme in support of the RCAF. Furthermore, the development of the eleven functional concepts ought to incorporate the results stemming from the development of these three initiatives.

Secondly, the OR&A are part of the five-eye defence science organization "the Technical Co-operation Panel" (TTCP); specifically they are part of the TTCP Aerospace Technical Panel (TTCP AER TP-11) "Challenging and Future Operations." AER TP-11 is currently engaged in a process to align the activities of all panels in the AER Group with each Nation's defence strategies. As this five-eye panel's intent is on sharing methods and tools between Canada, Australia, New Zealand, the UK and the US, we offer this analysis as a template method; mapping each nation's defence policy with this US strategy is a good first step in trying to finding a common priority of aerospace R&D initiatives. This should then be followed by mapping each nation's defence policy to each of its five-eye allies' government strategies.

Prepared by: Dr. Brad W. Gladman and Dr. Andrew Billyard (DRDC – Centre for Operational Research and Analysis).

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