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EVOLVING JOINT OPERATIONS: FUSION OF THE CP140M AURORA CAPABILITIES WITH HUMAN INTELLIGENCE AND INFLUENCE ACTIVITIES

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JCSP 38

Master of Defence Studies

PCEMI 38

Maîtrise en études de la défense

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Word Count: 20 131

Compte de mots: 20 131

ACKNOWLEDGEMENTS

The author would like to acknowledge the support, guidance and patience of Dr. Walter Dorn. This is a personal and professional achievement that has been very long in coming and would not have been possible without his support. The author would also like to thank the Canadian Armed Forces (CAF) members who contributed to this academic journey. They reinforced to the author the notion that we have significant potential within the joint operations community to enhance the performance of another aspect of CAF operations and integrate more seamlessly with our Allies. The CAF can maximize the effectiveness of the inter-relationship of air reconnaissance equipment, human intelligence (HUMINT) and influence activities (IA) by reassessing current training and organizations whose original purpose may have been far different in the past than what they are capable of achieving today.

Thanks are extended to Major (retired) John E. McLearn, CD, my former Commanding Officer of 3 Intelligence Company, Colonel Malcolm Young, CD, Regional Liaison Officer (Prairies and North) my current superior officer at the Canadian Forces Liaison Council and Chief Superintendent F.G. Peter Clark, MOM, my current Commanding Officer of “M” Division (Yukon) of the Royal Canadian Mounted Police for allowing me the time to focus on the project when I needed it the most.

Finally, but certainly not least, heartfelt thanks go to my wife Sonia and three children Gordon Rhys, Teaghen and Ariana for their patience, support and understanding throughout this entire process.

ABSTRACT

This study examines the ability of the CAF to increase the effectiveness of two types of land operations through the utilization of surveillance from a CP140M *Aurora* aircraft that was once used solely in the maritime environment and conveying this information through the All Source Intelligence Centre (ASIC), an organization that did not exist prior to operations in Afghanistan.

The major findings were that the collection, analysis and dissemination resources currently exist in the CAF to improve effectiveness of the integration of air reconnaissance, HUMINT and IA. As per several articles that have been written about the CP140 on current operations, there is the willingness on the part of many parties to connect these resources. There is an avenue to maximize the utility of the CP140 systems and link operational organizations to improve operations including counter-insurgency (COIN), United Nations (UN) Peacekeeping and others. There were several concerns identified throughout the project that included the protection of the CP140 Aircraft when supporting land operations, the competing demands for relatively few aircraft, the increased potential for information overload of soldiers and commanders, the costs associated with flying the CP140 and the associated maintenance requirements of the aircraft that was purchased by the Canada over 35-years ago. Through data collection, discussions and analysis, it became clear that the CP140 truly became a Multi-Mission Aircraft (MMA) with the installation of the AN/ASX-4 L3 Webcam MX-20 Electro-Optical Infra-Red (EO/IR) and V/UHF-4ARC-234 SATCOM. Though the CP140 may not be 'the' aircraft in the future that would provide surveillance, the CAF should take every effort should to develop the doctrine and further integrate the improved capability with Allied forces.

Our Allies, many of who have that have already been integrating air reconnaissance with other specialties for a much longer period, such as the United States Navy (USN) P3C *Orion* anti-surface warfare improvement program (AIP) on Operations Iraqi and Enduring Freedom (OIF and OEF), would also benefit from a CAF evolution identified in this paper.

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CHAPTER ONE

INTRODUCTION

BACKGROUND

The CAF, throughout the Afghanistan Campaign, was the recipient of the development of new equipment, increased numbers of personnel, and the development and reinitiating of specialized capabilities after a long period of forced reductions throughout the mid and late 1990s.[1] The resurgence of the CAF throughout this period witnessed a growth that included: an increased employment of the Primary Reserves beyond specialty trades domestically and operationally; the standardized training for particular trades within the Regular Force and the Primary Reserves; the reconfiguration of the Special Operations Force (SOF); the creation of the Canada First Defence Strategy[2]; the review of all capabilities and employment of military capabilities; and the initiation of specialist training amongst many changes from the Rifleman through to the Chief of Defence Staff.

This period of intense transformation was characterized as not only the CAF regaining its footing but also proactively learning how to organize its resources in such a manner to provide more capacity and capabilities with finite resources. Standardization, the evolution of joint command and operations and the maturing of doctrine and the evolution of tactics set military

[1] Canada. Department of National Defence. Chief of Review Services, *Audit of the Force Reduction Program* (Ottawa, January 1997) 2.
[2] Canada. Department of National Defence. *Canada First Defence Strategy* (Ottawa: Government of Canada, 2008), 7.

leaders on a path to be mutually supportive. Military leaders and their respective command staff drew on all of the intellectual capital of members to be actively engaged in the completion of missions by calling upon appropriate resources, regardless of element, to achieve the maximum effect possible.

This renewal of military operations in the ‘joint’ context would form the key component of military command and staff training at the Canadian Army Command and Staff College in its Army Operations Course and at the Canadian Forces College in the Joint Command and Staff Programme. This education and training was considered so vital to the broader team that residential and distance learning courses included a mixture of Regular Force, Primary Reserve and International Officers to obtain the knowledge necessary to work within a Staff or Command Joint Operations. Officers from all elements including all trades and specialties had the opportunity to work together over a one or two year period dependent on the format of the course attended to come to a mutual understanding of key concepts and, concurrently, an understanding of the employment of other resources. These courses identified opportunities that are contained within one specific element, or the majority to the training and development has been led predominantly by one specific element. For example, HUMINT has been predominantly led by the Canadian Army, IA has been led predominantly by the Canadian Army Reserves and air reconnaissance is led by the Royal Canadian Air Force (RCAF). In the day-to-day training of the entire CAF, there is little training amongst these three very specialized communities that have could have a significant impact to CAF operations. The awareness of all three discussed in this paper would conceivably occur during one of the courses/programmes noted above and, due to the nature and level of the leadership, have the opportunity to discuss the potential inter-

relationship and decide on avenues to pursue them or raise them to the appropriate level of decision makers.

PURPOSE OF THE STUDY

The purpose of this study is to show that the information that the CP140M can now obtain through its upgraded sensors, in particular the EO/IR, and fused through the All Source Intelligence Centre, provides the potential to improve the overall effect of Human Intelligence and Influence Activity Operations. The study identifies that there is a current and historical demand for the capabilities similar to that of the CP140 by the operational community, many of whom many not be aware of its existence. The study will attempt to show that the majority of the pieces necessary to maximize the informational and intelligence value from the sensors of the upgraded CP140 are already in place with the exception of the tactics such as the determination of when and where to emplace persistent surveillance, regular training between the RCAF, HUMINT, IA and Intelligence communities on how to best work together, the development of doctrine such as where pre-analysis leaves-off and higher level fusion begins and experience through the physical employment of these capabilities, in the context described in this paper, on operations. An effort along each of these lines would be recommended to bring to fruition the integration of these capabilities and maximize the utility by increasing the real-time and actionable pre-analyzed information and intelligence including having HUMINT and IA representatives on the aircraft. The study will also identify that though two ‘client’ communities have been identified, HUMINT and IA, that there are a vast number of potential ‘clients’ throughout the Canadian operational community who could be present on the aircraft and maximize the value of pre-analyzed information obtained through the sensors.

The question then becomes: Does the CAF have the necessary number of CP140M aircraft to meet the potential demands by the operational community to be employed on new? This begs another question: Will the CP140 resources are so constrained in light of the demand that the selection of what support will be given to operations will be very stringent and may be so severe that 'Status Quo' Maritime Patrol Aircraft (MPA) will be the default position and limited and specific support be offered when only absolutely required? The final question then becomes: Will Canada ever really maximize the potential of this resource to the operational community? I will investigate whether there is concern that the reality of the limited number of CP140 aircraft and no current replacements or procurement and upgrade of additional airframes will cause resistance to perceived potential over-tasking of the airframes and contribute to regression vice progression and evolution of the aircraft and its new array of sensors or open the door to embodying key sensors, including the AN/ASX-4 L3 Wescam MX-20 EO/IR on other platforms such as large Unmanned Aerial Vehicles (UAV).

You can never have too much reconnaissance.
General George S. Patton Jr., 1947

MOTIVATION FOR THE STUDY

The author has been a member of the Canadian Intelligence Branch since 1991. Prior to transferring he was an Artillery Reconnaissance and Commend Post Technician with 1st Field Regiment of the Royal Regiment of Canadian Artillery. Throughout the early 1990's he was very interested in all types of reconnaissance assets and sensors that eventually led to the position of Sensor Coordinator with the Atlantic Militia Area Intelligence Section, responsible for the

Intelligence Collection Plan and proper employment and tasking of all sensors in the battle space and the submission of requests for information and data from Allied sensors and tasking requests to the RCAF for air reconnaissance. Though much of this experience was attained and practiced in the field during various exercises across Canada such as Rendezvous 1992, multiple Army Concentrations and support to Exercise Final Drive at the Canadian Army Command and Staff College, the lesson of the proper employment and tasking of all sensors from all Elements was not lost and well-practiced as the author progressed in his part-time career as an Intelligence Operator. Concurrently, the author completed his first two undergraduate degrees and was almost finished his post-graduate degree when recruited by IMP Aerospace Components Limited in Amherst, Nova Scotia where he was ultimately the Program Manager responsible for all manufacturing and repair & overhaul work related to the CP140 Aurora/P-3 Orion for the RCAF, the Royal Australian Air Force (RAAF) and the USN. This brought the author in contact with the MPA community and the multiple permutations of sensors and capabilities that the aircraft had embodied on them to perform task. Several squadrons had already been adept supporting ground based operations; however, the Canadian Aurora Fleet was still fixated on MPA and there were very few joint operations. The author was appointed as the Project Manager for the installation design and installation of the Aurora Incremental Modernization Project Group (AIMP) Block I Legacy Systems. This project included bringing together many disparate/discrete avionic and structural upgrades under one umbrella project and then, after Group One completed the prototype phase, he became the AIMP Block II B, Communications Management Systems Project Manager up to the Ground Test Readiness Review when he accepted a deployment to Afghanistan as the Deputy Commanding Officer of the All Source Intelligence Centre (ASIC) on Operation *Athena* Rotation four in Kabul and Joint Task Force Afghanistan Operation *Archer*

Rotation zero in Kandahar. It was during these missions that the author recognized the importance of observation from air platforms to increase the success and improve the decision making processes employed by operational commanders and their staff. The experience, on reflection, made it clear to the author that the utilization of air reconnaissance technology could be used on a multitude of operations that the CAF contributes members such as UN Peacekeeping Missions where accurate, real-time information and intelligence can assist UN observers make mission related decisions and have greater situational awareness of all parties involved to better posture resources and provide assistance and support as needed.

CONTRIBUTION TO THE LITERATURE

The intent of this study is to show that the CAF currently has the ability to integrate air reconnaissance with HUMINT and IA operations seamlessly with existing resources. Though this integration was not a goal of any one of four disparate projects during their respective initiations (AIMP, HUMINT, ASIC and IA), the continual participation in theatres of conflict and employment of each of these specialties has demonstrated that there is significant potential to integrate them and harness even greater value. There are currently multiple projects to harness the information; however, there is yet to be an ongoing research, development training and operation of an air platform, on a regular basis, to support HUMINT and IA operations through though all of the necessary pieces currently exist in the CAF inventory. This intent of this study is to introduce the notion that there is an opportunity to make better use of these capabilities and improve the ability to generate greater situational awareness from HUMINT and IA operations to facilitate an increased speed of decision making by commanders such that they can have more

deliberate and appropriate action while having a greater planning capability for follow-on actions. The post-AIMP CP140M aircraft is proving to be a more versatile and operationally relevant aircraft that what was thought during its initial purchase. The AN/ASX-4 L3 Webcam MX-20 EO/IR with the associated ARC-234 SATCOM allows information to be captured and processed quickly and opens the door for secondary processing by motion imagery analysts of the Photographic Exploitation Detachments (PED), a group directly within the Canadian Forces Joint Imaging Centre (CFJIC). The CP140 has been predominantly used by the RCAF and Royal Canadian Navy for a very specialized anti-Submarine Warfare (ASW); however, the post-AIMP CP140M is starting to demonstrate continually on operations in Libya and Iraq that it is a strategic MMA by seamlessly supporting land operations in addition to air operations. The CP140 can prove invaluable to the CAF by providing the persistent surveillance that will continue to reduce the *fog of war*[3] that every Commander is faced with when determining the best course of action to take on operation from COIN through to UN peace operations. Action from knowledge, the effective utilization and integration of capabilities, leveraging off of the synergies derived through working together regularly and acknowledging the opportunities to improve capabilities and support to a mission would refine these resources such that Commander's would have greater battlefield visualization.

[3] Carl *von* Clausewitz, *On War. Edited and translated by Michael Howard and Peter Paret*. (Princeton, N.J.: Princeton University Press, 1976), Page 67.

OUTLINE

This study has been arranged that it will provide an introductuion to the topic area through a build-up of material related to historical data, a discussion of the specialized capabilities, a discussion on the CP140 aircraft and the thoughts about integration of all three communities and the potential opportunities and challanges that they envisage with such an effort. In greater detail:

1. A review of the historical literature was conducted (see Chapter 2). As an overview, the historical review begins by taking a brief look at the history of Canadian Intelligence, Canadian Air Reconnaissance and the CP140 Aurora Aircraft. Additionally Chapter 2 will discuss some of the techniques concerning the integration of air reconnaissance through the intelligence process through to the operational community that has evolved over the last decade with other nations and can be gainfully employed by the CAF. The discussion then moves to consider several approaches to the management of the information and the opportunities and challenges that comes with the information gained. This will include topics such as the intelligence cycle, information collection plan, processing of data and information into intelligence and dissemination of the information to the operational staff and commanders. While an entire operation is not the focus of the research, thought must be given to the issue so as to develop a better understanding of the entire situation faced by the commander and subordinate staff through to convoy commanders, infantry sections, HUMINT teams, IA Teams and UN Peacekeepers dependent on mission;

2. Chapter 3 presents the All Source Intelligence Centre in the current operating environment. Though this organization is typically part of the National Command Element (NCE) of Canadian operations, it also provides significant support to tactical commanders directly or through their Battle Group Intelligence Sections. This section will look at the inherent capabilities already embodied in the organization and how information can be processed through the ASIC to the operational community. It will also reinforce that, similar to the committal of RCAF Air Intelligence Staff to the Canadian Army in the Second World War to increase the analysis, processing and dissemination of air reconnaissance information, there is need to have the ability to adjust collection priorities and maintain tasking control of the sensor by the RCAF community;

3. Chapter 4 will discuss HUMINT and IA in the current operational environment and how the support of air reconnaissance will start to fill gaps that have been routinely identified in their operations. This chapter will discuss the importance of having better information on sources and having a greater ability to measure the effectiveness of IA operations. These specialties work in small teams in unfamiliar environments with differing cultures, people and competing demands dependant on adversary, conflict or other demands such as the need for resources or greed. Each of these communities work in a very complex environment where greater situational awareness is key to performance and the most effective allocation of their specialized resources to support operations. This chapter will

discuss the types of challenges faced by the specialists and how persistent surveillance would help more intricate planning to have greater impact to an operation;

4. Chapter 5 will discuss the new sensor capabilities at the UNCLASSIFIED level embodied on the CP140 Aurora Aircraft post-AIMP and the experience gained through the employment of the aircraft on Operation *Mobile* and Operation *Impact*. This section will also review how other countries are ultiizing the AN/ASX-4 L3 Wescam MX-20 on similar aircraft and how this could have an influence on how Canada employs its system in the future;

5. Chapter 6 entitled 'Thoughts from the Field – Maximizing Air Reconnaissance Sensors to Increase the Effectiveness of HUMINT and IA is a compilation of discussions with Suject Matter Experts (SME) in several senior and technical roles. These people have, in many cases, senior level experience in Air Operations, Influence Activities, Different Expeditionary Operations (UN, USA, NATO and ISAF), HUMINT, the ASIC and ASW. A structured interview nor questionnaiare was not developed given the small number of specialists and, the disparate experiences and backgrounds of each member as they relate to their own thoughts of air reconnaissance integreation, the opportunities, the risks, potential improvement and thaier advice; and

6. Chapter 7 entitled 'Conclusions and Recommendations' provides a final synopsis of the study and five recommendations based on the research conducted in this study.

LIMITATIONS OF THIS STUDY

Throughout the project there were opportunities to expand the scope; however, the project would have gone beyond the limitations identified in the initial proposal documentation. Additionally, as the project matured, there were areas that could have been improved; however, at the time the potential improvements were acknowledged, the project was past the point that these could have been adequately incorporated. The main limitations of the project were the ability to secure classified information as the researcher lives in Whitehorse, Yukon that does not have Department of National Defence approved/designated storage space or facilities to hold classified documentation as the only facility in operation, Joint Task Force North Headquarters Detachment Yukon is unable to satisfy this requirement and inhibits the ability to publish this DRP online. Further to this, the ability to meet face-to-face with the operational community on a regular basis prevented the ability to go further into depth with data collection through structured interviews and potentially the employment of questionnaires. Though these were not employed, the general message from those people contacted, the data from other publications, a review of the history of the use of air reconnaissance and the upgraded aircraft was that many can see that this capability exists and that, with the creation of operating procedures, training and exercising, that Canada could begin using this capability in the manner discussed quickly.

CHAPTER TWO

HISTORICAL REVIEW

A Brief History of Canadian Military Intelligence

> Know the enemy and yourself; in a hundred battles you will never be in peril. When you are ignorant of the enemy but know yourself, your chances of winning or losing are equal. If ignorant both of your enemy and yourself, you are certain in every battle to be in peril.
>
> Sun Tzu, The Art of War

The current day Canadian Intelligence Branch can trace its roots through the intelligence-like activities performed by the explorers of the New World that had many aspects including the production of topographical maps, collection of information from human sources and creating a broader understanding of the terrain, weather and indigenous people that they would interact with into the future.[4] This intelligence advised military, political and industrial leaders that supported the growth and development of North America as we understand it today. The progressive elaboration of the intelligence picture allowed military and political commanders to make choices of which indigenous people to work, ally or war with, which pieces of land to settle and what routes allowed for greater trade, expansion and transport. In essence, many organizations with interest had continual two way communications to understand their current operating environment.[5] Whether it was the Hudson's Bay Company and French Voyagers establishing trading posts reaching ever westward and northward through to the British and French militaries in their quest to colonize and hold the newfound territories through to the

[4]Harold A. Skaarup, *Out of Darkness - Light: A History of Canadian Military Intelligence,* Volume 1, *Pre-confederation to 1982* (Lincoln, iUniverse, 2005), 75-76.
[5] *Ibid*., 96.

politicians establishing governance and relations, intelligence was needed.[6] Militaries also employed intelligence activities heavily throughout the colonization of British North America. The Yankee Rangers scouted for the British Forces throughout the period of the Seven Years War. French and British militaries employed Guides, Rangers and Indigenous people to obtain information on the opposing force, terrain or routes through reconnaissance, observation, interrogation. Canada was still little known but becoming more known as the results of the information were recorded on maps, orders and plans.[7] Though the term Intelligence does not appear to have been used, it is apparent that the Intelligence function and tradecraft was heavily employed by multiple groups. It was not until 7 February, 1862 that Canada has its first official 'intelligence-like' unit named "4th Troop of Volunteer Cavalry of Montreal (Guides)". This unit was renamed to "The Royal Guides - Governor General's Body Guard for Lower Canada" and ultimately "The Guides".[8] They were heavily employed throughout the Fenian Raids on reconnaissance duties; however, were disbanded in 1869.[9] It was not until the North-West Rebellion that Canada and the British Empire had its first designated "Intelligence" unit, a scout unit from Dominion Land Survey named the "Intelligence Corps". This unit, the size of a modern day Platoon, had three Officers and thirty non-commissioned members performing long-range reconnaissance. More units grew; however, all were disbanded once again on 18 September, 1885.

Calvary Units provided much of the reconnaissance and guide activities for the next seventeen years. On 6 February, 1901, Lieutenant-Colonel V.B. Rivers became the first

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[6] *Ibid.,* 98.
[7] *Ibid.,* 112.
[8] Major S.R. Elliot, *Scarlet to Green: A History of Intelligence in the Canadian Army 1903-1963* (Toronto: Hunter Rose Company, 1981), 3.
[9] *Ibid.,* 6.

Intelligence Staff Officer of the Canadian Militia.[10] With strength of 185 officers, the Corps of Guides was established on 1 April, 1903 and had representation in all twelve of Canada's Militia Districts including a District Intelligence Officer in each location who reported to the Director General of Military Intelligence.[11] This group was a Mounted unit and focused on reconnaissance, information collection and mapping. By 1914 the Corps of Guides had grown to over 500 personnel and included both officers and non-commissioned members. Fortunes changed for this unit during the Great War and many were hived off to serve with other units in the Canadian Army and others served with the British Intelligence Corps. Few remained with the Corps of Guides; however, those that did stay established the intelligence architecture throughout the Canadian Expeditionary Force. This group was involved in the crafting of Intelligence for Commanders by using the reports provided from air, sea and land including aerial photography, conducting interrogation, exploiting captured documents and equipment, information from their own liaison and reconnaissance including the establishment of one cyclist company per each Division.

Throughout the war the products prepared by intelligence staff improved with the goal of providing each Commander the situational awareness necessary for decision making. The reports, based on observation from riflemen in the trenches through to specialized reconnaissance elements (air, sea and land) was processed to provide the intelligence picture that was continuously analyzed and assessed and fed directly into the decision making cycle of the Commander. Changes to the intelligence picture would be incorporated and lead to either immediate action or part of long-term planning for subsequent actions. More knowledge and a clearer picture of the battlefield that, in some cases, was many miles away, gave the Commander

[10] *Ibid.,* 12.
[11] *Ibid.*

greater flexibility and more deliberate action, the ability to adjust activities when required and, through battle damage assessments, the ability to determine whether a decision/action was successful or not and how it impacted.

One significant feature of air reconnaissance and aerial photography for a prolonged period was the inability of land resources to impede their constant observation and collection, limited solely by the fuel in the aircraft itself. Until the aircraft and land resources evolved inhibit these operations, intelligence staff benefitted from greater situational awareness and a more detailed intelligence picture that was conveyed to Commanders. Reconnaissance aircraft evolved to have greater protection and tactics to suppress enemy air defences as the need for the information and subsequent intelligence derived from this information was highly desired by Commanders who now considered every aircraft having a 'reconnaissance' role.

It was during the Great War that Canada established its own HUMINT unit for counter-espionage simply denoted the "Intelligence Section" to deal directly with enemy Agents. The Corps of Guides was later converted into a Cyclist Company and, as with Intelligence/Intelligence-like units prior, were all disbanded on 31 March, 1929.[12]

The remaining Canadian Intelligence personnel were structured after the British Organizations; however, very few existed after the outbreak of the Second World War when Canada mobilized in September 1939 through to December 1940 there were approximately 60 Intelligence positions in the Canadian Military with a demand for over three times that amount who eventually formed the Canadian Intelligence Corps, authorized on 29 October 1942. Throughout the Second World War the demand for Intelligence personnel grew in numbers and types, especially with the establishment of the First Canadian Army. The centerpiece of the

[12] *Ibid*., 485.

entire Intelligence architecture was the section at Canadian Military Headquarters in London England. Though the British Intelligence Corps still conducted most of the training of Canadian Intelligence personnel, Canadians assumed this responsibility incrementally starting with handling of cipher messages. Concurrently, RCAF Air Intelligence was reformed and was aligned directly with Army Intelligence at the formation level. The air intelligence staff, working with both the RCAF and RAF, provided aerial photography, stereoscopy and assessment of enemy land, sea and air capabilities and the current state of the terrain. Though every airframe was considered to have the ability to provide some level of air reconnaissance information, two squadrons in particular, 400 and 414, were designated air reconnaissance squadrons. Each squadron was initially equipped with the Westland Lysander and would later be provided Curtis Tomahawk I, Mustang I and the Photographic Reconnaissance (PR) Spitfire XI. Due to the nature of these aircraft and the ability to engage targets, they would be later designated 'fighter-reconnaissance' aircraft. Air reconnaissance provided vital information for the planning of the D-Day invasion, tactical photos to the Army and would engage targets of opportunity.[13] Lessons learned from the air reconnaissance of the First World War underscored the importance of these two staffs working closely together to process the information garnered from aircraft back to the frontline. The efforts were much larger than solely air reconnaissance information as new intelligence staffs were formed such as Artillery Intelligence, Counter Intelligence, Engineer Intelligence and other specialists such as interrogation teams, communications analysts and others.[14]

[13] The History Hangar, http://www.400squadron.ca/history-section/History. Internet; accessed 31 December 2015.
[14] Major S.R. Elliot, *Scarlet to Green: A History of Intelligence in the Canadian Army 1903-1963* (Toronto: Hunter Rose Company, 1981), 519-528.

Throughout the Second World War, Canadians were very active in HUMINT operations, signals intelligence (SIGINT) and espionage.[15] These positions were voluntary and would serve within the British Special Operations Executive and later train at Camp X in Ontario, Canada. Canadians, including Sir William Stephenson, had direct experience in HUMINT operations from the First World War that was then applied to the Second.[16] By the end of the Second World War, Canada had developed a comprehensive intelligence capability for all three services that was able to export the lessons learned to ensure that the country would not lose hard earned capabilities. The air reconnaissance capabilities were of such significance that several organizations were established between 1948 through to 1960. They included the Joint Air Photo Interpretation School (JAPIS), the Air Photo Interpretation Centre (APIC), and Number 1 Army Photo Interpretation Section (APIS) that eventually became the Joint Photographic Interpretation Centre (JAPIC). In order to service all three elements, the JAPIC became the Defence Photographic Interpretation Centre, CF Photo Interpretation Unit, Directorate of Imagery Exploitation and then the CFJIC that still exists today.[17]

Concurrently, the Canadian Militia was authorized to establish six Intelligence Training Companies in 1948. They were: No. 1 in Montreal, No. 2 in Toronto, No. 3 in Halifax, No. 4 in Vancouver, No. 5 in Winnipeg, and No. 6 in Edmonton. These Training Companies provided a pool of trained Intelligence personnel to augment the Regular Force.

The intelligence community maintained specialization within the trade; however, many were still controlled by an element. As Canada moved further into peacekeeping roles during the

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[15] *Ibid.*, 501.
[16] Stevenson, William, *A Man Called Intrepid: The Secret War*. Globe Pequot (2000), 92-103.
[17] Major S.R. Elliot, *Scarlet to Green: A History of Intelligence in the Canadian Army 1903-1963* (Toronto: Hunter Rose Company, 1981), 522.

Cold War era and utilized financial resources more frequently for other purposes than military expenditures, the Intelligence Branch would see that, with the integration of all three armed services that they were not considered essential and the Canadian Intelligence Corps, the Clerk-Intelligence trade, the Canadian Provost Corps, and the Air Force Police were reformed into the Security Branch in 1967. This was a tremendous setback for the entire intelligence community and of those who remained, witnessed the gradual erosion of specializations, skill-sets and training. The Militia was hit the hardest with the disbanding of all of the Intelligence Training Companies, members who chose to stay in the Militia now found in Service Battalions across the country or in small Intelligence Sections at each of the Militia Area Headquarters.[18]

It was not until 1981 that the Intelligence Branch would break away from the Security Branch, officially formed on 1 October 1982 with re-badging occurred on 29 October 1982, the 40th anniversary of Canadian Intelligence Corps. Training was dated, members were few and the reconstitution of the Militia through the Intelligence Sections stood at 46 members all ranks across Canada by 1991.[19] Lessons once learned were being relearned and the cadre that had remained started to rebuild the intelligence specialties, training, school, reserves, sections and units. Initially the training would be across all three elements such that Intelligence Operators and Officers could serve any of the three elements; however, by the turn of the millennium, training would be element specific. The main reason for the more specialized training was to take advantage of a growing number of Intelligence personnel across the entire

[18] Harold A. Skaarup, *Out of Darkness - Light: A History of Canadian Military Intelligence,* Volume 1, *Pre-confederation to 1982* (Lincoln, iUniverse, 2005), 75-76.
[19] Harold A. Skaarup, *Out of Darkness - Light: A History of Canadian Military Intelligence,* Volume 2, *1983-1997* (Lincoln, iUniverse, 2005), 82-85.

Canadian Armed Forces to shore-up the much needed support to ongoing operations.[20] The divergence from previous practice is that analysts were accustomed to the practices, skills and products of each element and could support multiple roles regardless of element; however, the time to attain this level of training and competence was significant. The intelligence branch is also highly dependent on the Militia Companies. These companies constitute over 450 members all ranks and provide 30% to over 50% of the operational intelligence staff.[21] The current Militia Intelligence Companies in the CAF include: 6 Intelligence Company (Edmonton, Vancouver and Winnipeg), 2 Intelligence Company (Toronto) and 7 Intelligence Company (Ottawa), 4 Intelligence Company (Montreal), and 3 Intelligence Company (Halifax).[22] Part of the training for Primary Reservists in these units once included familiarization training with other elements, training in air photo analysis and stereoscopy.

The Intelligence tradecraft and the need for information throughout the history of Canada have been continuous. What has not been continuous is the financial or organizational support as, other trades, predominantly combat elements, are the priority whenever there are constrained resources. Nevertheless, the Intelligence community has consistently rebounded and provided the products and advice necessary for decision makers to have greater situational awareness that normally leads to more sound planning and decision making. This community is evolving with technology, tactics and methods in an effort to enhance a common operating picture and strive toward battlefield visualization. Part of this evolution was the development of the ASIC, first

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[20]Harold A. Skaarup, *Out of Darkness - Light: A History of Canadian Military Intelligence*, Volume 3, *1983-1997* (Lincoln, iUniverse, 2005), 51-55.
[21] *Ibid.*, 560-561.
[22]Major Harold A. Skaarup, *Canadian Military Intelligence: A Short History* (Winnipeg: CFTMPC, 2000), 7.

used in 2003 in Afghanistan on Operation *Apollo*, will be covered in Chapter 5 and the creation of the Canadian Intelligence Command (CFINTCOM) on 27 June 2013. This organization is comprised of:

1. CFJIC;
2. Canadian Forces National Counter-Intelligence Unit;
3. Joint Meteorological Centre;
4. Mapping and Charting Establishment; and
5. Joint Task Force X (HUMINT & Interrogation).

Canadian Intelligence has experienced many peaks and troughs throughout its history, currently at a height that it has not witnessed since the zenith of the Canadian Intelligence Corps prior to 1967. This being stated, even though there is great demand for Intelligence, historically it has been financial demands that has caused the Canadian Military to focus on their most critical components, intelligence personnel rarely being considered critical.

A Brief History of Canadian Air Reconnaissance

Air reconnaissance in its truest sense was in existence before the First World War and dates back to the invention of the photograph and would later have this equipment placed on balloons, buildings and other structures. Amrom H Katz, on the subject of the evolution of air reconnaissance, noted that, "Any full account in this period would have to show a tangled web of science, technology, reaction, arguments and military and civilian application."[23] The distinct advantage is having greater situational awareness from a greater perspective than without this knowledge. The Canadian War Museum noted that prior to the First World War: 'aircraft were

[23] Amron H. Katz, *Some Notes on the History of Air Reconnaissance* (The Rand Corporation, 1966), Page 5.

initially used for reconnaissance to track the movement of enemy troops and often carried cameras to photograph the battlefield. These photographs were later used to study enemy fortifications and transformed into maps for the infantry. By 1916, aircraft assisted the artillery in spotting the fall of shells, helping to coordinate and correct fire. Enemy guns and troops were forced to camouflage their positions to hide them from aerial observation".[24] As discussed in the previous section, it was readily apparent that air reconnaissance was key to obtaining battlefield visualization without having to see it for one's self and start to look at aspects such as enemy, weather and terrain in near real time to try to ascertain what an opposing force would likely do and make decisions on the actions of one's own force. Another glaring shortcoming of air reconnaissance in its infancy was in the ability to communicate with the ground except with streamers and dropped packages until the advent and use of short-range radio systems.[25]

In the interwar years, the RCAF was able to continue maintaining its skill-sets by integrating into military and civilian applications due to drastic funding reductions to the military after the Great Depression.

> In 1932, after seeing gradual growth, the RCAF was slashed by one-fifth, releasing 78 officers and 100 airmen because of the world wide depression at the time. This left the total strength at 103 officers and 591 airmen. For three years the RCAF was barely able to survive, but in 1935 the situation began to gradually improve. This time period also heralded a major change to the concept of operations. For years the RCAF had been engrossed in civil aviation; now it was about to become a military air force.[26]

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[24] Canadian War Museum. http://www.warmuseum.ca/firstworldwar/history/battles-and-fighting/air-war/aerial-reconnaissance/. Internet; accessed 16 October 2015.
[25] *Ibid.*
[26] Don Nicks. CanMilAir. *A History of the Air Services in Canada*, http://www.canmilair.com/rcafhistory.htm Internet; accessed 02 December 2015

With improving technology, a more robust RCAF and the movement to a more assertive role in the Second World War, air reconnaissance improved significantly and was embedded into every major headquarters including Naval Command with the Battle of the Atlantic and the First Canadian Army Headquarters.[27] This capability improved to the point that "the Reconnaissance Wing carried out photographic and tactical reconnaissance to gather information, first for planning the operation itself and then in aid of the advance. This wing was to end the war deeper in Germany than any other RCAF unit."[28] Communications was far easier than the previous war and operating procedures to exploit the aerial photography had improved tremendously with intelligence air photo analysts not taking in-depth photo-imaging training.[29]

As noted with the history of military intelligence in Canada, the importance of air reconnaissance was never forgotten as it is considered essential as it improves the situational awareness of Commanders and decision making. The Canadian Intelligence Corps ensured that these skill-sets were retained in newly established units dedicated to solely to imagery and photography.[30]

Canada has continuously maintained the air reconnaissance training and skill-sets in the RCAF with platforms that such as the DeHavilland CP121 *Tracker*, Canadair CP107 *Argus*, Lockheed Martin CP140 *Aurora* and the Lockheed Martin CP140A *Arcturus*. Many of these aircraft have multiple roles such as ASW, Search and Rescue (SAR) and MPA; however, each is also capable of conducting air reconnaissance. It can also be argued that all CAF aircraft can

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[27] *Ibid.*
[28] Canada. Veterans Affairs Canada. Overseas http://www.veterans.gc.ca/eng/remembrance/history/second-world-war/canada-and-the-second-world-war/overseas. Internet; accessed 02 December 2015.
[29] Major S.R. Elliot, *Scarlet to Green: A History of Intelligence in the Canadian Army 1903-1963* (Toronto: Hunter Rose Company, 1981), 124.
[30] *Ibid.*

have a reconnaissance role if tasked to perform such.[31]When the CP140 was purchased, the aircraft was fitted with a special air photo camera that necessitated the rearrangement of the sonobouys, thus emphasizing the importance this capability had within the RCAF and need to have it retained.

Air reconnaissance continues to be a pillar in the RCAF community and in very high demand including the recent missions in both Libya and Iraq; however, with the few aircraft that Canada now possesses, there is no manned aircraft that is solely designated for air reconnaissance while, concurrently, the demand for air reconnaissance is growing including the use of UAVs worldwide. The aircraft, such as the CP140 becoming far more capable of air reconnaissance over any terrain makes it that much desirable by the operational community. Several recent articles on the topic of the role of the CP140 over Libya from the aircrew's perspective noted that the aircraft are capable, the air crews are trained and the need for real-time situational awareness from Long Range Patrol Aircraft (LRPA) is at a point that it is only natural to pursue this option more seriously.[32] Operation *Impact* further underscores the importance of the situational awareness that the CP140 can bring to the table for the entire operational community.

[31] Discussion with Major J.E. McLearn, 04 December 2015.
[32] Captain Daniel Arseneault and Captain Josh Christianson, *Punching Above Its Weight: The CP140 Experience within Task Force Libeccio and Operation Mobile*. (The Royal Canadian Air Force Journal, Volume 1, No. 3, Summer 2012), Pages: 27-37

A Brief History of the CP140

Canada made a commitment to replace the anti-submarine war-fighting aircraft platforms for the RCAF and in 1980 opted to procure the CP140 *Aurora* Aircraft. This aircraft, based on and already successful model incorporated into the USN, the P-3 *Orion*, was to become the only surveillance and reconnaissance aircraft capable of patrolling Canada's coasts.[33]

The CP140 aircraft is a combination of a later model P-3C *Orion* airframe and an S-3 *Viking* (United States) Avionics. The Canadian military also altered physical features of the aircraft to allow for an air photo camera for aerial reconnaissance by rearranging the sonobuoys. In essence, Canada recognized the importance of system integration early on with the CP140 individually and would later see this aircraft evolve into becoming a system-of-systems and enter into the realm of strategic reconnaissance.[34] When procured, the CP140 Anti-Submarine Warfare (ASW) mission suite was integrated by an AN/AYK-502 (Univac 1832) digital processor, an upgrade of the S-3 *Viking's* Univac 1832. This was a key feature of the platform where the internal integration of sensors made the aircraft more effective at surveillance and detection and neutralization of submarines. The Aurora stored library of target "signatures" that focused searches for specific threat targets. When a target that was in the library was detected, it alerted the operator for follow-on target prosecution. Throughout the Cold War and based on the experiences of submarine warfare throughout the Second World War, the CP140 was procured to have a more modern aircraft focused on MPA and ASW. The training, exercises and integration amongst the MPA RCAF and RCN communities was clearly aimed at ensuring the best possible

[33] *Ibid.*
[34]

outcomes in the ASW role. In terms of support to land operations, when tasked, the CP140 would provide air photographs of selected areas to support land training on bases such as Canadian Forces Base (CFB) Gagetown; however, this training was not optimized as the HUMINT, other than the interrogation capabilities practiced since WWI, and IA capabilities had yet to commence or were in their infancy.[35] Additionally, the CP140's communications systems gave it superior command and control capabilities of other cooperating ships and aircraft compared to existing aircraft in the CAF such as the CH124 *Sea King*.

Throughout the 1980's the CP140 would start to be introduced into other maritime roles as part of a Whole of Canada/Government of Canada effort. New missions were assigned such as the detection of drug trafficking in the maritime domain with the Royal Canadian Mounted Police (RCMP), fisheries patrols for illegal fishing, pollution detection with the Federal Department of the Environment, illegal immigration with Citizenship and Immigration Canada and maritime search and rescue.[36] It was throughout the early 1990's that the CP140 community with continuous interaction and operations with other communities, including working with the US P3 community, started to envision more diverse roles for the aircraft than MPA; however, no formal announcement was made to employ the CP140 on CAF operations until Operation *Apollo* in 2003 that would see the aircraft working with the USN and RAAF that already had land support capabilities. The Canadian CP140 community was being quickly exposed to an entirely new clientele with new requirements and demands from the capabilities of the aircraft. The AIMP project made the aircraft more usable to the Commanders of these missions that would later see almost every variant of the CP140 as it progressed through each Block of the AIMP.

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[35] Canada. Royal Canadian Air Force. *Expanding the CP-140 Modernized Aurora Fleet* (2014). http://www.rcaf-arc.forces.gc.ca/en/news-template-standard.page?doc=expanding-the-cp-140-modernized-aurora-fleet/hszrx7qw. Internet; accessed 21 November 2015.
[36] *Ibid.*

The CP140M is a medium-sized aircraft that is capable of completing many small tasks through to very specialized support. The CP140M aircraft, now 35-years old, by virtue of the Aurora Structural Life Extension Project (ASLEP) may have another 15-year period, or 15,000 flying hours added to its serviceability to the CAF.[37]

Table 2-1: Technical Specifications of the CP140[38]

Manufacturer	Lockheed Martin Aircraft Corporation
Aircraft Description	The Lockheed P-3 *Orion* with S-3 *Viking* avionics suite
Length	35.61 metres
Wingspan	30.37 metres
Height	10.30 metres
Empty Weight	27,892 kilograms
Maximum Gross Weight	64,410 kilograms
Power	Four Allison T-56-A-14-LFE turboprop engines
Maximum Speed	750 kilometres per hour
Cruising speed	648 kilometres per hour
Service Ceiling	10,668 metres
Range	7,400 kilometres
Endurance	12 hours, with routine planning of 10 to 11 hours. The Aurora has remained airborne for up to 17 hours
Surveillance Equipment	APS 508 multi-mode Imaging Radar System. Modular VME Acoustic Signal Processor acoustics system. Internal and externally launched, active and passive sonobouys. MX20 EO/IR camera. AN/ASQ – 508 magnetic anomaly detector (MAD). Link-11 Tactical Data Link. AN/ALQ 217 Electronic Support Measures (ESM). Fully integrated Data Management System.

[37] Canada. Royal Canadian Air Force. http://www.rcaf-arc.forces.gc.ca/en/aircraft-current/cp-140.page. Accessed 01 December 2015.
[38] *Ibid*.

Weapons System	Mark 46 Mod 5 torpedoes; signal charges; smoke markers; illumination flares. Air-to-surface rockets or conventional bombs can be fitted after a minor retrofit to the wing pylons. Virtually any armament cleared for use on the P-3 *Orion* series can be fitted for use based on airframe similarities.
Equipment	Two sea "survival kit—air-droppable" (SKAD) Arctic SKAD unit
Crew	Up to 10, including 2 pilots, 1 flight engineer, 3 air combat sensor officers, 5 airborne electronic sensor operators (The crew size will vary according to mission.).
Year procured	1980
Locations	19 Wing Comox, British Columbia 14 Wing Greenwood, Nova Scotia
Quantity in the CAF	18
Original Cost	$24,905,000.00

The current configuration of the CP140M has opened many doors and probable missions such as Intelligence, Surveillance and Reconnaissance (ISR), SAR on sea and land, Deception Operations, Maritime Operations, Naval Gun Support (NGS), over-the-horizon targeting, anti-ship missile defence, ship observation and classification, Electronic Warfare (EW) and SIGINT, Chemical Biological, Radioactive and Nuclear (CBRN) reconnaissance, SOF support, Psychological Operations (PSYOPS), meteorology, land based indirect fire support and combat air support, route and landing zone reconnaissance, radio and data relay and more.[39]

The CP140, when procured, was already looking over the horizon at the threat of the day with the Cold War yet still being very progressive by successfully meshing the P3C *Orion*

[39] Ron Walker, "What Happened to Air Force ISR?" Canadian Forces Command and Staff College, Joint Command Staff Programme, 2009.

airframe with S3 *Viking* while concurrently ensuring that the aircraft could still multirole by installing the air-photo camera. The system integration was such that, in an ASW capacity, the aircraft was self-reliant for target acquisition and prosecution. CP140 aircrews have been molded into the ability to be self-reliant as necessary, collecting and processing information throughout their missions and communicating with multiple stakeholders whether it is with another helicopter, ship or even a strike aircraft.[40] The aircraft, its crew, training and experience conducting reconnaissance has made it an invaluable resource to the operational community, demand for its services growing incrementally while serving as a catalyst in the CAF to reinvigorate projects to not only look at a future replacement for this aircraft but additional upgrades beyond the AIMP (discussed in Chapter 5), the Joint Unmanned Surveillance Targeting and Acquisition System or even the procurement of smaller aircraft that would be solely ISR focused.[41] The CP140, with a strong foundation in air reconnaissance and ASW has become a major strategic asset and workhorse for the entire CAF with far more potential that what is even considered today.

[40] Captain Alan Lockerby *"SCAR-C Over Libya - To War in an Aurora",* Canadian Military Journal Vol. 12, No. 3, (Summer 2012), 66.
[41] Ottawa Citizen, *Canadian military seeks more surveillance capability for Iraq war,* http://ottawacitizen.com/news/national/canadian-military-seeks-more-surveillance-capability-for-iraq-war. (10 November 2014) Internet; accessed 17 November 2015.

CHAPTER THREE

THE ALL SOURCE INTELLIGENCE CENTRE IN THE CURRENT OPERATING ENVIRONMENT

The ASIC is the current construct of the Intelligence Architecture that has been in continual development, evolving since the Second World War under different titles and organizations.[42] The most recent predecessor, the Intelligence Collection and Analysis Centre (ICAC), had the majority of the capabilities of the ASIC; however, the focus of the organization was heavily land-centric and did not have the same flexibility to adapt to different operations as the current day ASIC. What the ICAC did provide was the nucleus for the ASIC organization that had the central 'fusion' section where all other sections feed into.[43] An ASIC will normally deploy from CFINTCOM with the National Command Element (NCE)NCE for larger deployments and the lead will depend on the mission and type of intelligence. For example, throughout the Afghanistan Campaign, Operations *Apollo, Athena, Archer* and *Attention*, were predominantly land centric operations, the head of the ASIC and the majority of staff were from the Canadian Army with support from the RCAF and RCN, predominantly for SIGINT specialists. In terms of more recent Operations, such as *Mobile* and *Impact*, the RCAF was the lead element with support from the RCN and Canadian Army. For example, HMCS *Charlottetown* was also provided intelligence support from HMCS *Trinity*, the RCNs Intelligence Center for Maritime Forces Atlantic. The aircraft were provided intelligence support from the ASICs at the airbases in Italy and Iraq respectively.

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[42] HaroldA. Skaarup, *Out of Darkness - Light: A History of Canadian Military Intelligence Volume 3, 1983-1997* (Lincoln, iUniverse, 2005), 21-22.
[43] Ibid., 67.

The ASIC is a dynamic organization that is tailored to missions to accommodate what is perceived to be the support required to a Commander. As this is a large organization that works at all three levels of intelligence - strategic, operational and tactical (Table: 3-1) it will normally only deploy on larger operations.

Table 3-1: Levels of Intelligence[44]

Strategic Intelligence	Intelligence that is required for the formulation of policy and strategy at the national level. This is the highest level of intelligence derived from information gathered over the widest possible area in response to national requirements across the spectrum of national military, diplomatic, political and economic issues.
Operational Intelligence	Intelligence that supports the planning and conduct of campaigns and major events at the operational level.
Tactical Intelligence	Intelligence that supports the conduct of engagements.

The organization is typically deployed with sections from SIGINT, Counter Intelligence (CI), Imagery Intelligence (IMINT), Geomatics team, HUMINT, Fusion Intelligence Section as well as the command, administrative staff and technicians for their systems. The organization can support other intelligence staff and integrate other organizations such as a PED for greater live motion analysis, Measurement and Signature intelligence personnel, Allied intelligence

[44] Parliament of Canada. Jim Cox. PRB 09-22E Intelligence: Definitions, Concepts and Governance http://www.parl.gc.ca/Content/LOP/researchpublications/prb0922-e.htm. Internet; accessed 26 November 2015.

liaison officers, other government department intelligence personnel, e.g. CSIS, DFAIT, CSE and the RCMP.

In terms of capabilities, the ASIC has the ability to communicate information at all levels of security including to ground, sea and land assets with reach back through to national level intelligence centers and full production capabilities from topographical maps and reports through to imagery, models and other analysis. The fusion element is key as there is significant integration of disparate systems at varying levels aimed at one target, the commander's situational awareness and achievement of battlefield visualization under a common operating picture.[45]

There are two main types of intelligence that the Canadian Army places emphasis on, Basic and Current;[46] however, an ASIC, by integrating other capabilities and organizations has to look at three other types, Estimative, Target and Warning,[47] especially when heavily involved in the targeting process and working predominantly at the Strategic and Operational level.

Table 3-2: Functional Types of Intelligence[48]

Basic Intelligence	Intelligence that provides reference material for planning and a basis for processing subsequent information. It consists of background about any relevant subject and is maintained in databases that are continually updated. It may contain intelligence on such things as adversary capabilities, deployments, leadership, history and training. The principal uses of basic intelligence are to set the scene at the outset of operations and explain relatively unchanging facts such as battlespace terrain and

[45] Discussion Major J.E. McLearn 04 December 2015.
[46] Canada. Department of National Defence. B-GL-357-001/FP-001F, Land Force Information Operations Field Manual – Intelligence. (2001), 6.
[47] Parliament of Canada. Jim Cox. PRB 09-22E Intelligence: Definitions, Concepts and Governance http://www.parl.gc.ca/Content/LOP/researchpublications/prb0922-e.htm. Internet; accessed 26 November 2015.
[48] *Ibid.*

	weather.
Current Intelligence	Intelligence that seeks to explain what is happening in the current situation and what will probably happen next. It is an important element of Situational Awareness (SA).
Estimative Intelligence	Intelligence that provides forward-looking assessment and predictive judgment. It attempts to project probable future adversary courses of action and their implications.
Target Intelligence	Intelligence that provides the targeting data for the targeting process. It identifies and locates the components of a target or target complex, indicating their vulnerability and relative importance.
Warning Intelligence	Intelligence that provides warning of threats to national interests in time to take effective counteraction.

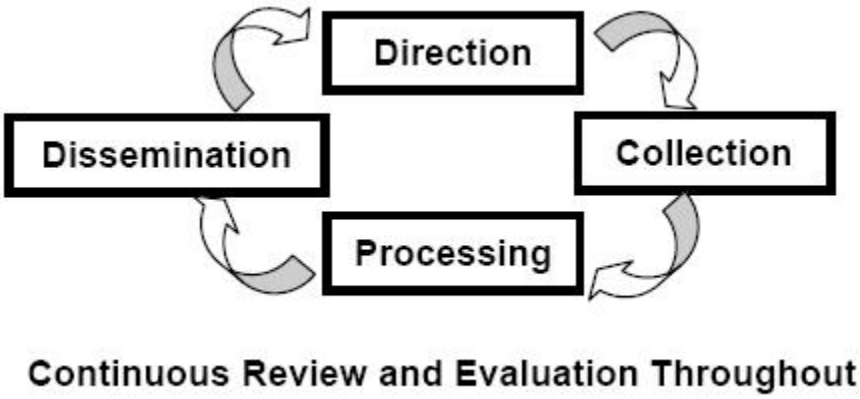
> The intelligence product does not evolve haphazardly. It comes about as the result of a disciplined, iterative and continual process of identifying requirements, collecting information, analyzing that information and disseminating the product to those who need it. This, in a nutshell, is the intelligence cycle.[49]
>
> Jim Cox

The ASIC at its very core is an organization that is performing the intelligence cycle continuously with a multitude of sources and agencies to produce a true intelligence picture for the commander's situational awareness. It is in its strict discipline yet simplicity of the overall

[49] Parliament of Canada. Jim Cox. PRB 09-22E Intelligence: Definitions, Concepts and Governance http://www.parl.gc.ca/Content/LOP/researchpublications/prb0922-e.htm. Internet; accessed 26 November 2015.

process, resources, and guidance that the organization is able to produce sophisticated results. The organization follows a well-worn and well understood cycle as seen in Figure 3-1.

Figure 3-1: The Intelligence Cycle[50]



The initial part of the Intelligence Cycle, Direction, from the Commander where the Intelligence Staff can work to identify the intelligence problem, review the priority intelligence requirements (PIR) from the commander, assess the information requirements (IR) that have to be collected and processed to address the PIRs, identify the indicators for each IR and start to produce specific requests for information (RFI) throughout the intelligence network to start filling in the gap between what is known and what is unknown.[51] All of this activity is aimed at focusing the intelligence effort. In practice, these steps are all occurring at the same time within

[50] *Ibid.*
[51] Canada. Department of National Defence. B-GL-357-001/FP-001F, Land Force Information Operations Field Manual – Intelligence. (2001), 26-30.

the organization and some steps may be skipped as one current intelligence file may feed directly into another more developed one.

In this study, the interaction of the CP140 with the ASIC will be discussed in terms of the conveyance of preliminary analyzed information from the crew on the CP140 and fused with the other information and intelligence from the systems housed in the ASIC of all of the functional types identified above. Part of the interaction is the necessity to include the CP140 in the Intelligence Surveillance Target Acquisition and Reconnaissance (ISTAR) Plan and the Intelligence Collection Plan (ICP). The aim of this effort is to achieve information and intelligence superiority with the ultimate goal to complete the mission. The ISTAR Plan "will coordinate the efforts of all available information collection resources into one collection effort."[52] As identified earlier, the intelligence personnel continuously determine the requirements including critical pieces of information needed, assign priorities of collection, develop the plan, commence the collection including the concurrent processing of the information and intelligence acquired and redirect the collection resources as appropriate through the operations staff.[53] This plan is 'living' and the ASIC must have avenues to communicate with the collection resources throughout especially for real-time issues that may present themselves and have a tangible impact on the operation.

> … what is needed is an all-source, holistic, fused approach to analysis that takes into account sociocultural ambiguities.
>
> Ben Connable[54]

[52] *Ibid., 103.*
[53] *Ibid., 104-109.*
[54] Military Intelligence Fusion for Complex Operations: A New Paradigm, Ben Connable, http://www.rand.org/pubs/occasional_papers/OP377.html; Internet; Accessed 29 December 2015.

The fusion aspect involves processing the information with other types of information and intelligence from all sources that are being collected concurrently through the ISTAR and ICP or already exists within the several databases. This fusion that would provide the potential to improve the overall effect of Human Intelligence and Influence Activity operations by having near real-time situational awareness would potentially include SIGINT, IMINT, HUMINT, CI, Geomatics and integrated all other relevant intelligence through the fusion (intelligence) section. Products can range from detailed maps through to reports and include supporting imagery from the photographs of persons of interest through to cut-outs of link analysis diagrams denoting the inter-relationships of people, organizations, locations and activities. The ASIC, by its very nature, with multiple analysts are able to perform fusion analysis quicker than smaller sections and disseminate back to the operational community via multiple means including presentations, electronic mail, posting on classified intranet websites, and secure radio. The CP140 crew is also able to receive this product and continue to perform preliminary fusion and information is collected through the sensors. The HUMINT teams as part of or separate from the ASIC and IA teams have the capability to receive the intelligence products from both the CP140 and the ASIC for greater situational awareness over the AN/PRC-117F/G Multiband Manpack Radio carried by both types of teams and able to connect to secure laptops when necessary.[55]

In addition, the ASIC is normally configured to allow for the inclusion of intelligence and information from a variety of sources such as Allied and National level agencies. The ASICs dedicated team of all source intelligence analysts. Beyond the dissemination to teams such as HUMINT and IA, the ASIC will also disseminate intelligence product to the appropriate

[55] Discussion, Major (retired) John E. McLearn, 29 December 2015.

commanders and stakeholders at higher, flanking (if any) and lower organizations as well as supporting agencies as permitted by security policies. The ASIC allows for a far more detailed intelligence picture than what can be accomplished on the CP140M due to the greater number of feeds from sources and agencies; however, it requires more time to process information into intelligence due to the volume of data. By disseminating in this manner, the entire operation will have greater situational awareness and improved decision making and call in the expertise from other HUMINT and IA organizations for support and expertise where warranted. This ability, of the ASIC to link additional specialists, that may be outside the theatre of operations, to the aircraft quickly is another significant capability augmented further that through the technology of the sensors, SATCOM and computer systems, can all read the same information, real time. This ability, to reach-out to other organizations or reach-back to higher level intelligence centers located in Canada provides even greater value to both the ASIC and specialists onboard the CP140 conducting persistent surveillance let alone the HUMINT and IA Operators and Planners.[56] An ASIC and the CP140, through surveillance and continual fusion of intelligence have the opportunity to determine trends and patterns of life far more than before, growing a comprehensive picture and a greater understanding of patterns of life, linking relationships in greater depth and having a more comprehensive measurement of success of discrete operations and the overall success mission that cannot be obtained through binoculars, foot patrols or other traditional methods such as those regularly conducted by forces operating in Afghanistan. It provides the opportunity to observe in real time any indicators that would address IRs for the appropriate Commander to make a decision. It is likely that the indicator observed will be

[56] Discussion, Major (retired) John E. McLearn, 29 December 2015.

observed first by the CP140 crew above a target, thus giving the opportunity for quicker communication and on-site preliminary analysis.[57]

In essence, the ASIC is a very large, multi-specialty intelligence center that, after receiving direction, collects, processes (fuses) and disseminates intelligence products from all sources. It is a large organization with significant capabilities that is task tailored and led by respective elements with responsibilities for all three levels of intelligence. Normally the ASIC places greater emphasis on the operational and strategic levels and less emphasis on the tactical where other formation level organic intelligence sections exist; however, specialties such as HUMINT are a core client. ASICs will normally only deploy on large operations with the NCE This being said, smaller missions may only have an intelligence staff of section size and, should a CP140 be allocated to the mission, would work alongside a PED. Between the two they would be responsible for the intelligence interface with the aircraft and fusing potentially preliminary analyzed information obtained by a sensor.[58] The variable in terms how the amount of intelligence will be the size and scope of the operation that ultimately dictates the resources deployed including their relative size and specialties to the mission in accordance with the permission of Host Nations or lead organization.[59] This is of particular importance to HUMINT and IA teams that may be deployed including their expectations from the CP140 and Intelligence Sections as they will not have the same capacity of an ASIC.

[57] *Ibid.*
[58] Discussion, Warrant Officer Kevin Mendioroz, 03 December 2015.
[59] Discussion Major J.E. McLearn 04 December 2015.

CHAPTER FOUR
HUMAN INTELLIGENCE AND INFLUENCE ACTIVITIES IN THE CURRENT OPERATING ENVIRONMENT

> The rapid pace of operations, the need to provide near-real time (NRT) support of command decisions and the inherent time delays … necessitate the dispersion of HUMINT collection assets to forward areas in support of critical operations… This forward deployment gives HUMINT collectors earlier access to sources and is facilitated by enhanced communication and automation capabilities down to the collection team level.[60]

HUMINT and IA activities in the CAF are not recent phenomenon and in many cases have been tested and tried in war from the founding of Canada through to current operations. Similar to the history of the Canadian Intelligence Branch, more generally, the specialties were learned, tried and tested; however, quickly lost as part of reductions, peace dividends and other initiatives that reduced the Canadian military.[61] In most allied countries, IO organizations, particularly the PSYOPS specialty, are part of the Intelligence trade; however, Canada has opted to approach these specialties differently, relying heavily on the Primary Reserve community and open to all trades. Though this approach has yielded many opportunities and access to skill sets not normally resident within the Canadian Army Combat Arms Units that form the body of trades that members usually come from, there are significant challenges in terms of training, recruiting, retention, progression and simply being a specialization instead of a trade within the CAF.[62]

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[60] United States. Army. FM 2-22.3 Chapter 5 HUMINT Collector Operations (2006), 5-1.
[61] Harold Skaarup, *Out of Darkness - Light: A History of Canadian Military Intelligence Volume 1, Pre-confederation to 1982* (Lincoln, iUniverse, 2005), 313.
[62] Canada. Canadian Army. *Psychological Operations.* http://www.army-armee.forces.gc.ca/en/5-cdn-div-ia/index.page. Internet; accessed 25 November 2015.

HUMINT activities are usually housed under the ASIC on operations reporting back through to CFINTCOM for technical advice and providing intelligence to the operation. This specialty was reinvigorated throughout the 1990's whereby people from any trade or service could apply to be screened and, if successful, be trained as a HUMINT Operator. As HUMINT Operators work in small teams, they are heavily reliant on each other and go through extremely detailed planning of every operation ensuring the best possible situational awareness. The types of missions that they conduct have significant risk such as knowing the sources that they interact with well, understanding who the sources speak to, their allegiances, movements and otherwise that could determine whether the source is good or posing additional risk.[63] HUMINT Operators must continuously assess the credibility and reliability of all sources and agencies from cross related information and intelligence that can be obtained from other sources or agencies, SIGINT, assessments from the ASIC, basically all means available.[64]

HUMINT Operators are typically well equipped and have direct communication with the ASIC, the HUMINT Section and the Task Force at all times through regular communication and special communication means. This is significant whereas with the AN/PRC-117F/G Multiband Manpack Radio, regularly carried by HUMINT Teams, has a frequency range 30-512 MHz frequency range and is certified the transmission of voice and data traffic up to the Top Secret level. A CP140 over the ARC234 can communicate directly with the team including data that can go through the radios to a laptop for products such as still digital photography and live motion. The importance of this communications loop is that the teams can receive information and fused data from the CP140 operators as a situation unfolds and make decisions quicker not

[63] Canada. Canadian Army. *Psychological Operations.* http://www.army-armee.forces.gc.ca/en/5-cdn-div-ia/index.page. Internet; accessed 25 November 2015.
[64] Discussion, Major J.E. McLearn, 04 December 2015.

having to wait for information to be processed after the aircraft lands. In addition, HUMINT and the very nature of human interaction, the ability to observe a target and any interactions that they may have with other targets/persons of interest or their activity after a meeting with HUMINT operatives is extremely valuable and perishable. The CP140 sensors and flight endurance has already demonstrated the capability to provide persistent surveillance to land and sea stakeholders on operations.[65] The ability to communicate with and potentially have HUMINT representation on the CP140 to perform preliminary analyze and fuse the information in near real time while concurrently communicating it back to the ASIC increases effectiveness. The ability to develop tactics and training of this nature and employ on operations could have significant impact to operations for HUMINT and the overall situational awareness of the Commander.

IA Operators, predominantly PSYOPS and CIMIC, are faced with similar challenges as the HUMINT Teams; however, they are not directly connected to the ASIC but to the IA Coordination Centre (IACC) for their situational awareness. Carrying similar communications as the HUMINT teams, the IA operator have the ability to speak directly with aircraft; however, any additional information or intelligence that would be available from the ASIC would not necessarily be with the IACC. Part of the reason for this is that the IA community, built predominantly on Primary Reservists, does not have sufficient security clearances at the Top Secret Special Access (TSSA) level to work in the ASIC. They also have little to no experience or training in the analysis and processing of information into tactical or operational intelligence products for Commanders.[66] They rely heavily on the information from their teams for the

[65] Captain Daniel Arseneault and Captain Josh Christianson, *Punching Above Its Weight: The CP140 Experience within Task Force Libeccio and Operation Mobile*. (The Royal Canadian Air Force Journal, Volume 1, No. 3, Summer 2012), 30.
[66] Discussion, Major J.E. McLearn, 04 December 2015.

situational awareness to prepare plans. This was identified as a major short-coming on Task Force Afghanistan Rotations by several Commanding Officers including Major John E. McLearn who was the Commanding Officer of 3 Intelligence Company that housed Intelligence, CIMIC and PSYOPS personnel on continuous deployments into the ASIC, HUMINT Teams, PSYOPS Teams and Battle Group Intelligence Sections.[67]

In terms of the information that HUMINT Operators seek, it can include criminal activity, gang-related activities, counter espionage, adversary movements, resource routes and disposition of different organizations. In many cases, these activities do not happen in the open and occur under the cover of darkness making it extremely difficult to observe people and places prior to, during and post HUMINT operations. Technological advancements in persistent surveillance would improve this situation exponentially as the targets may never know that they are or have been observed.[68] This would increase the ability to assess the credibility and reliability of sources and agencies, improve operator safety and allow better planning and execution of operations to provide a more enhanced Intelligence picture.[69]

In each of these cases, HUMINT and IA interact with people on missions with extrem complexity, both reporting back through different coordination cells and both learning information either deliberately or via the course of working with local people in the area of operations. As they deal directly with humans, it is acknowledged that there are far more unknowns than knowns so all intelligence and information critical for the enhanced detailed planning for their small parties that deploy relatively undefended with the exception of their own

[67] Discussion, Major J.E. McLearn, 04 December 2015.
[68] *Ibid.*
[69] *Ibid.*

personal means. The addition of a CP140M and associated information gathered through the MX-20 EO/IR system in support of their mission as identified at given locations and times would provide greater situational awareness, operator safety, better planning and preparation to increase mission success.[70]

[70] *Ibid.*

CHAPTER FIVE

NEW CAPABILITIES: THE CP140M AURORA AIRCRAFT POST-AURORA INCREMENTAL MODERNIZATION PROJECT

The CP140M has brought to the forefront capabilities that were not thought possible when the aircraft was initially procured that move the platform from sole a MPA aircraft to one that is truly versatile and has the ability to be seamlessly integrated into sea, land or air operations.[71] The significance of its ability to provide real time information and intelligence is a combat multiplier and, when reviewing the success of the employment of the P3C *Orion* aircraft with earlier versions Webcam EO/IR on OIF and OEF by the USN in support of the United States Marine Corps (USMC) it illustrated that the importance of surveillance in a theatre of operation.[72] The capabilities of the aircraft have already been tested by Canadians on Operations *Mobile*, *Impact*, *Odyssey Dawn* and *Unified Protector* in addition to Operation *Apollo* in 2002 and 2003 with AIMP Black I modified aircraft.[73]

The ability of the CP140M to directly suport these missions and the reasoning for embarking on this study are directly attributable to the AIMP first initiated in 1997. This project, given its scope and cost was broken into three Blocks that will be described below and also created challenges where at one point in the project there were three separate and distinct CP140 configurations. Though this study looks closely at the MX-20, it must be clearly understood that

[71] Canada. Royal Canadian Air Force. http://www.rcaf-arc.forces.gc.ca/en/aircraft-current/cp-140.page. Internet; accessed 01 December 2015.
[72] Defence Industry Daily. http://www.defenseindustrydaily.com/Up-to-329M-to-Maintain-MX-20-Turrets-on-USN-P-3s-05139. Internet; accessed 01 December 2015.
[73] Canada. Royal Canadian Air Force. http://www.rcaf-arc.forces.gc.ca/en/aircraft-current/cp-140.page. Internet; accessed 01 December 2015.

the MX-20, without the additional upgrades would not have the same effectiveness as an entire weapons platform. The project was initially envisioned as an enhancement to the MPA and ASW capability and did not immediately recognize that the evolution of the entire aircraft would allow it to seamlessly integrate into a wider network of intelligence and operational systems thereby becoming an important 'system' within 'systems'. In addition, the aircraft will be in service much longer than originally believed after the ASLEP adding another 15,000 flying hours or approximately 15-years to the service life of the aircraft.[74]

AIMP Block I (Completed 2010)

The aim of AIMP Block I was to update older and non-compliant equipment for operations and to be compliant with international air certification regulations. To remain compatible with Canada's allies in the ASW and MPA role, some operationally essential systems were made part of the Block I Project. The AIMP Block I included:

1. Installation of Strobe Lights;
2. Removal of the windscreen rain repellant system;
3. Replacement of the older Sonobuoy Receiver System with a 99 Channel AN/ARR-502B (V) Sonobuoy Receiver;
4. Replacement of the upper fuselage panel;
5. Installation of a new digital radar scan converter;
6. Replacement of the Main Landing Gear fittings

[74] Canada Newswire, "IMP Aerospace rolls out first CP140 Aurora aircraft with new wings for the Royal Canadian Air Force," http://www.newswire.ca/en/story/892979/ imp-aerospace-rolls-out-first-cp-140-auroraaircraft-with-new-wings-for-the-royal-canadian-air-force Internet; accessed November 17 2015

7. Installation of the new Flight Data Recorder / Cockpit Voice Recorder / Crash Position Indicator;
8. Installation of a Rockwell Collins HF 121 BD radio;
9. Installation of an Iridium Satellite Communications (SATCOM);
10. Removal of the OMEGA navigation system;
11. Replacement of the Radio-teletype printer;
12. Relocation of the KGX-40; and
13. Modification of avionic equipment Rack Two.

AIMP Block I changes allowed each aircraft to also be standardized into a single configuration whereas throughout the years a number of smaller/discrete projects had made various adjustments to individual aircraft and not necessarily the fleet. This also included any modifications made by aircrew that moved control units within each station to accommodate individual needs to make the systems and controls more accessible. This became an issue later in the Block II for the Human Factors Engineering Requirements of the Communications Management System Project.

AIMP Block II (Completed 2011)

The next Block of the project, AIMP Block II, consisted of two parts. The first part, AIMP Block II A was the Navigation and Flight Instrument Modernization Project (NFIMP). The second part, AIMP Block II B was the installation of the Communications Management Systems Project (CMS). Though related, these projects had two separate Prime Contractors and one Installation Sub-Contractor. The AIMP Block II A NFIMP consisted of the following installations:

1. Four Electronic Flight Instruments including the Pilot/Co-Pilot: Electronic Flight Director Indicator, Electronic Horizontal Situation Indicator and Control Display Units (CDU) and the installation of an EHSI and DCU at the navigator–communicator station;
2. Two CMA 2082 full colour, programmable CDUs for navigation data management and monitoring health of interfaced navigation systems. (The CDU's would also control the communications equipment installed on AIMP Block II B);
3. Two Embedded GPS inertial navigation systems to provide greater stability for the Synthetic Aperture Radar Antenna and better navigation;
4. An Automatic Flight Director System;
5. A LPIA-194 Radar Altimeter and Altitude Warning System including Height Indicators; and
6. An Aircraft Collision Avoidance System.

The AIMP Block II B CMS Project replaced the old system and integrated legacy, improved data transmission and upgraded radios. The existing system could not handle the number of new radios or the technology and was considered obsolete. The communications capability within and external to the aircraft was improved significantly. The CMS project installed and integrated the following systems:

1. Three new V/UHF radios;
2. Two new HF radios,
3. A new SATCOM radio;
4. Palomar internal control units; and
5. A new VHF (AM) radio.

This project had several other facets through the prototype development phase that improved the configuration management of the aircraft, involved a complete Human Factors Engineering Study of the aircraft on ground and in the air through all five phases of flight and,

though acknowledging that the RAAF had already embodied the Palomar ICS into their P3 Orion fleet, sought a CP140 solution that prepared for the next systems in AIMP Block III.

AIMP Block III (Completed 2012)

AIMP Block III updated the Data Management System (DMS). This brought all previous systems together for a final configuration and interface of all assets on the aircraft. The DMS project includes a new computer and sensors which consists of the following installations:

1. A new mission computer including corresponding multi-purpose displays;
2. An acoustic signal processing system;
3. An acoustic tape recorder;
4. An electronic surveillance system;
5. An electro-optical surveillance system (Wescam MX-20); and
6. A synthetic aperture radar.

The completion of AIMP Block III made the CP140 a true MMA with the Integrated Mission System from the collection of information through the new sensors, processing through the mission computer and dissemination through the communications systems. With the integration of two separate MIL-STD-1553B[75] data buses, one dedicated to avionics and the second for the mission, the CP140 is able to process vast amounts of tactical information and have a greater degree of crew situational awareness and ability to detect and prosecute targets. After the Mission Computer, three CDUs are the next most vital component to the overall control

[75] AIM. MIL-STD-1553B Tutorial https://www.aim-online.com/pdf/OVW1553.PDF. Internet; accessed 21 November 2015

and communications throughout a mission. The integration of all systems through the updated Mission Computer ensures seamless interfacing between all sensors. In essence, the Mission Computer is fusing all the incoming information to produce a real-time solution to a tactical problem.[76]

AN/ASX-4 L3 Wescam MX-20 Electro-Optical Infra-Red (EO/IR)

This study identifies one of the installations during AIMP Block III, the AN/ASX L3 Wescam MX-20 EO/IR. This system is a high-performance, long-range multi-sensor imaging system made for larger aircraft requiring longer operational standoff distances such as the CP140. The turret is stabilized through an Inertial Measurement Unit true 6-axis stabilized gimbal to achieve high optical zoom performance. The AN/ASX-4 has a 3000m spotter scope.[77] The payload is comprised of sensors:

1. Infra-Red (High Definition);
2. Colour daylight camera with zoom and step spotter lens;
3. Mono low-light camera with step spotter lens;
4. Laser Range-finder (Eye Safe, 30km range);
5. Wide angle laser illuminator; and
6. Narrow angle laser illuminator.

What the system brings to the CAF is the ability to see a greater area by day or night, the ability to coordinate strikes, enhanced reconnaissance and the ability to plan more succinctly with greater situational awareness. The data can be streamed through the MC and then the ARC-

[76] CP-140 Aurora Electronics Suite http://jproc.ca/rrp/rrp3/cp140_electronics.html. Internet; accessed 15 November 2015.
[77] *Ibid.*

234 to the ASIC, a PED or in terms of real-time information to troops-in-contact, HUMINT Operators, IA Teams and a multitude of other users who need to know what the picture looks like at that very moment. With the ability to facilitate indirect naval or land gunfire, the EOIR is an indispensable piece of equipment.

AN/ARC-234 SATCOM

The UHF SATCOM terminal (V/UHF 4) AN/ARC-234 is a software programmable half-duplex UHF/VHF DAMA SATCOM airborne-qualified terminal designed to be compatible with the USAF standard DAMA-capable UHF SATCOM terminal. It is designed to provide UHF SATCOM operation in a high co-site environment on aircraft with multiple emitters, or when operating in the vicinity of friendly ground troops using high power VHF and UHF equipment. An even greater advantage is that by having personnel onboard and aircraft, there is the ability to have preliminary analysis directly to the end-user, something that a UAV cannot provide in a similar fashion. It operates in the 30 to 512 MHz frequency band which covers Canadian Army frequencies FM (30 to 90 MHz), Air Traffic Control frequencies (108 to 128 MHz), land mobile frequencies (128 to 160 MHz), UHF LOS frequencies (225 to 400 MHz), UHF SATCOM (270 to 320 MHz) and UHF land mobile/special purpose frequencies (405 to 512 MHz).[78] It includes an embedded DAMA modem and embedded COMSEC. The modem is interoperable with the MD-1324 DAMA modem and also operates in high speed UHF SATCOM. The modem will run from 75 bps to 48 kbps in the SATCOM mode and at up to 64 kbps in the LOS mode. Embedded

[78] *Ibid.*

COMSEC functions include KY-58, KYV-5, KG-84 and KG-10 and KG-11 TRANSEC devices (also found in the ASIC).[79]

In essence, the SATCOM has the ability to transmit the data from the MC originally captured by a sensor, e.g. MX-20, to any other military network.

Operation *Mobile*

CP140 aircraft were deployed as part of Operation *Mobile* operating under UN Security Council Resolution 1973 (2011) in the mission in Libya aimed at the protection of civilians. It should be noted that, unlike Operation *Apollo* that utilized AIMP Block I modified aircraft, Operation Mobile utilized AIMP Block II modified aircraft and had the Wescam EO/IR installed on their platforms. Where the AIMP Block II DMS had yet to occur, the EO/IR was interfaced with an overland electronic missions suite (OEMS) that consisted of three laptop computers. The EO/IR was limited to video and still photographs.[80]

The role of the aircraft was to employ the 'sensors to acquire and verbally indicate targets for multi-role fighter aircraft and to serve as spotters for offshore NGS missions.'[81] Throughout the mission and with members joining the CP140 as SCAR-C, Strike Coordination, there is a widening acknowledgement that the aircraft, even in its current configuration, is not employed to

[79] *Ibid.*
[80] Captain Daniel Arseneault and Captain Josh Christianson, "Punching Above Its Weight: The CP140 Experience within Task Force Libeccio and Operation Mobile". *The Royal Canadian Air Force Journal*, Volume 1, No. 3, Summer 2012, 34.
[81] Captain Alan Lockerby "SCAR-C Over Libya - To War in an Aurora", Canadian Military Journal Vol. 12, No. 3, Summer 2012. 63.

the maximum extent and there is a current need for the aircraft to integrate tactically and operationally with other land sea or air elements.[82]

Whenever the CP140M operates over land there must be full suppression of enemy air defenses (SEAD) to ensure safety for the aircraft, crew and by extension, the sensors employed.[83] The CP140M should only operate in an area with local air superiority and Electronic Warfare (EW) support or face the risk of not being able to employ the aircraft or losing it altogether.

Throughout the operations, many lessons were learned about the capability and the employment in terms of support to both land and sea operations. It was noted that air support to ground could be achieved with greater proximity and accuracy with a surveillance platform in place.[84] It also noted that the aircraft was more effective in a joint operation, have target laser designators integrated into the sensor package for precision weapons. Captain Lockerby noted that "… with proper specialists aboard (CP140) and under the direction of the appropriate ground agency, could extend these assets' coverage to the fullest possible extent.'[85] He argues that the commander would have 'not just a view of the other side of the hill but also the means to do something about it.'[86] The additional advantage is that there is a crew physical located over an target area, whether it is land or sea based, and by having people able to conduct preliminary analysis it increases the situational awareness; however, he notes that technology is not perfect and that he had to define targets with binoculars as there were issues encountered that the EO/IR could not perform better.

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[82] *Ibid.*
[83] *Ibid*., 64.
[84] *Ibid*., 65.
[85] *Ibid*., 66
[86] *Ibid*.

During the mission and after reflecting and writing about his experience, Captain Lockerby emphasized the importance of integrating the CP140 with the LRP community for both training and tasks and, with respect to air-land integration, something Canada was once very experienced in, he quoted Tour de France winner Greg LeMond who stated about racing "… when you have the fundamentals, acquiring the experience is just a matter of time."[87]

These lessons were further underscored by Captain Daniel Arsenault and Captain John Christianson on their article entitled "Punching Above its Weight: The CP140 Aurora Experience within Task Force Libeccio and Operation Mobile."[88] Aresenault noted that:

> The installation of the Wescam MX-20 electro-optics/infrared (EO/IR) camera in 2006 together with the overland electronic missions suite OEMS in 2009 done concurrently with the AIMP upgrades, offered a data-fusion-based capability growth … it enhances situational awareness, provides smart cuing of the EO/IR camera and assists target prioritization, greatly improving final imagery product with embedded event markers. Imagery can be digitally stored, with basic analysis in flight and downloaded upon landing. With the tactical common data link capability, video can be directly transmitted to remote video receivers or surface terminal equipment that can literally take control of the camera maneuvering …"[89]

Throughout the operation, the CP140 was responsible for embargo enforcement, NGS, SCAR-C, cross cueing with multiple air platforms and reconnaissance. The two members noted that the ability to have persistent surveillance operations by having other aircraft replace them on station and due to the endurance of the CP140 was " … perhaps one of the most valuable

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[87] *Ibid*., 67.
[88] Captain Daniel Arseneault and Captain Josh Christianson, *Punching Above Its Weight: The CP140 Experience within Task Force Libeccio and Operation Mobile*. (The Royal Canadian Air Force Journal, Volume 1, No. 3, Summer 2012), 28.
[89] *Ibid*., 29.

features of the Aurora is one that has existed all along…"[90] The authors that training and the ability to disseminate information to the users is critical and should be trained and exercised.[91] They also looked at the potential brought forth by the AIMP Block III DMS modified CP140M that would increase the entire ISR and related missions exponentially to '…render the CP140 one of the most capable MMA in the world, with its only true rival being the Boeing P-8 *Poseidon*."[92] Even in mid-AIMP modification, the return on investment was being realized by the operational community in terms of the new capabilities of the CP140.

Operation *Impact*

> Operation IMPACT is the Canadian Armed Forces' contribution to the Middle East Stabilization Force (MESF) – the multinational coalition to halt and degrade the so-called Islamic State of Iraq and Syria (ISIS) in the Republic of Iraq and in Syria. Op IMPACT is halting and degrading the so-called ISIS, which has lost the ability to operate freely in roughly 25 to 30 percent of populated areas of Iraq territory it previously controlled.
>
> National Defence and the Canadian Armed Forces[93]

As of 09 December 2015, the CP140M, a fully upgrade AIMP has "… conducted 346 reconnaissance missions."[94] Known as "Air Task Force-Iraq's CP-140 Long Range Patrol (LRP) Detachment" the CP140M can accomplish far more than the previous versions of the aircraft. The " … new sensors like the Wescam MX-20 camera and Ground Mapping Radar. The MX-20 can image points of interest with High Definition (1080p) resolution during the day and night,

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[90] *Ibid.*, 30.
[91] *Ibid*., 34.
[92] *Ibid.*
[93] National Defence and the Canadian Armed Forces. *Operation Impact*. http://www.forces.gc.ca/en/operations-abroad-current/op-impact.page. Internet; accessed 09 December 2015
[94] *Ibid.*

due to its heat-sensitive infrared camera. Thanks to developments in radar technology, even on days of total cloud cover, the Aurora can see through it, taking images of ground sites that rival anything a conventional camera can produce. This imagery can be sent immediately to analysts who identify and assess objects that merit further investigation or potential airstrikes."[95]

In essence, as demonstrated on both operations, the CP140 is going far beyond the initial envisioning of the aircraft in 1997 with the initiation of the AIMP project and with this, the ability to provide significant support, each lesson needing to be learned, harnessed and brought into the doctrine and training system for additional development and training. The question becomes, 'with so many capabilities, how do we prioritize the activities of the fleet?' This question will be discussed in the next section.

Aircraft Operation Cost

The commitment of a CP140 Aurora aircraft to any operation let alone training, exercises and operations within Canada is higher than any other aircraft in the RCAF. The full cost associated with the CP140 per Table 5-1 (below) by flying hour is $71,800. The range of costs, including purchase cost, per flying hour is from $4,500 to $71,800. The next most expensive aircraft to operate in the RCAF inventory is the CF188 Hornet at $60,500 or $11,300 less than the CP140. Due to the size of the crew, maintenance and Wing support personnel the CP140 has the highest personnel costs per flying hour of $26,400. In addition, the amortized cost of the aircraft per flying hour is the highest in the RCAF at $22,150. As noted above, with 346

[95] National Defence and the Canadian Armed Forces. *Operation IMPACT CP-140 Aurora Detachment Completes 100th Mission in Theatre* http://www.forces.gc.ca/en/news/article.page?doc=operation-impact-cp-140-aurora-detachment-completes-100th-mission-in-theatre/i6mizqn0 (09 March 2015). Internet; accessed 11 October 2015.

missions flown in Iraq by 09 December 2015 and assuming that each mission would be at least four hours of flight, the total costs not including transit to Iraq, would be $30,655,600, a significant cost to Canada. Planners at the strategic level would normally take the direct cost vice the full cost into consideration when offering specific capabilities to a given operation as, per any operation, once complete, there is an analysis of all costs involved reported to both the Government of Canada and Canadians.

Table 5-1 Aircraft Estimated Full Costs - Rates Per Flying Hour (FH) – Fiscal Year 2014-2015

Aircraft Type	Fleet Size (as detailed in TARM 13-14)	Fuel Consumption or Burn Rate (Litres per Flying Hour)	Average flying hours per aircraft per year (based on 95% of the estimated 2014-15 YFR)	Full Costs														
				Direct						Indirect								
				Variable						Fixed								
				Variable Operating Costs				Operational Readiness (Operational Readiness) (73%)	Total Operating Costs	Personnel Full Costs				Other Costs				
				POL	O&M	NP (Operational Dependent) (27% Allocation)	Total	NP (Operational Readiness) (73%)		Aircrew	In-Service Maintenance Personnel	Wing Support - Personnel	Total	Wing Support - O&M	Amort	Total	Full Costs
Transport																		
CC115 - Buffalo	6	840	269	1,050	200	2,700	3,950	7,350	11,300	2,300	4,150	9,450	15,900	2,800	500	3,300	30,500	
CC130 - Hercules	13	2,946	424	3,200	750	2,550	6,500	6,850	13,350	4,400	9,000	9,600	23,000	4,700	2,900	7,600	43,950	
CC130J - Hercules[2]	17	2,901	330	3,450	350	4,600	8,400	12,350	20,750	2,100	5,100	4,050	11,250	3,250	11,250	14,500	46,500	
CC138 - Twin Otter	4	254	404	350	350	350	1,050	900	1,950	2,350	1,800	1,250	5,400	350	150	500	7,850	
CC144 - Challenger[3]	6	267	267	1,500	1,150	2,350	5,000	250	5,250	2,250	2,300	1,050	5,600	500	3,100	3,600	14,450	
CC150 - Polaris	5	5,702	475	6,200	2,650	2,250	11,100	6,050	17,150	3,200	900	7,950	12,050	4,400	7,300	11,700	40,900	
CC177 - GlobeMaster[2]	4	10,596	784	11,600	1,450	2,250	15,300	6,050	21,350	3,000	4,300	6,000	13,300	4,250	10,550	14,800	49,450	
Fighters																		
CF188 - Hornet	80	4,626	148	4,900	800	3,000	8,700	8,050	16,750	1,300	10,800	6,450	18,550	6,800	17,950	24,750	60,050	
Trainers																		
CT114 - Tutor	27	1,091	130	1,150	800	550	2,500	1,550	4,050	1,250	2,700	2,700	6,650	3,650	0	3,650	14,350	
CT142 - Dash 8	4	622	451	650	350	400	1,400	1,050	2,450	1,700	5,850	2,150	9,700	700	1,250	1,950	14,100	
King Air B200[4]	2	470	475	500	50	650	1,200	1,800	3,000	650	200	450	1,300	200	0	200	4,500	
Helicopters																		
CH124 - Sea King	24	535	249	550	250	2,350	3,150	6,400	9,550	3,850	11,100	9,600	24,550	2,200	50	2,250	36,350	
CH146 - Griffon	84	369	243	500	250	700	1,450	1,950	3,400	3,300	3,150	4,450	10,900	3,550	1,750	5,300	19,600	
CH149 - Cormorant[2]	14	855	353	1,000	300	5,350	6,650	14,500	21,150	2,600	1,850	4,600	9,050	1,300	4,850	6,150	36,350	
Maritime Patrol																		
CP140 - Aurora	19	2,887	255	3,050	600	4,350	8,000	11,750	19,750	6,750	9,850	9,800	26,400	3,500	22,150	25,650	71,800	

In summary, the CP140 throughout and post-AIMP has successfully demonstrated significant capabilities on operations in both Libya and Iraq. It should also be noted that, despite the capabilities, there is also the costs associated with the operation of the CP140. Though

operational personnel are seeing the potential of this aircraft, cost alone would suggest that it only be deployed under strict parameters on significant operations to Canada.

CHAPTER SIX

THOUGHTS FROM THE FIELD: MAXIMIZING CP140M AURORA SENSORS TO INCREASE THE EFFECTIVENESS OF HUMAN INTELLIGENCE AND INFLUENCE ACTIVITY OPERATIONS

An unadulterated picture still tells a thousand words.

Anthony M. Thornborough

There is significant interest throughout the CAF on ways and means by which we can improve effectiveness with existing equipment and overcome traditional obstacles such as stove-piped capabilities. The author spoke to several SMEs about their ideas on the research area informally to understand some of the concerns that should be addressed. Though this study identifies only a few spoken with, it was considered important to have a range of rank and experience represented. Below are a summary of informal discussions on the topic in the Chapter title asking "What are your thoughts?"

Senior Air Force Officer: Air Operations

Speaking with a Colonel responsible for Air Operations in Afghanistan working in the NCE on Operations *Athena* and *Archer* he made several key points throughout a discussion on the new AIMP, the capabilities the support to HUMINT and IA communities and the potential demand for use on other missions, he added that this is an fantastic development; however, it comes with many risks so a measured approach may be required with a limited number of aircraft. First, there is the aircraft that is good for another 15,000 hours or 15 years. In that time

we must train, exercise, support missions, repair and overhaul, upgrade and seek another aircraft to transition to. He was very supportive of the entire evolution but noted that the CP140 community is small, highly skilled and would require tremendous amounts of training in all facets. Recruiting will become an issue is it is not already as crews will be tasked multiple times and, while aircraft are in maintenance or on operations, they are not training replacement aircrews to conduct the missions or have the ability to absorb more training types without significant investment in our people and the training structures that develop them into competent operators. The question becomes what is affordable and do we invest in solely today or today and tomorrow … and what does tomorrow look like? A P-8 *Poseidon*? He also noted that the ASLEP covers 'knowns' in terms of maintenance upgrades and repairs; however, there are other potential issues as the aircraft ages such as engines that we must review closely. In our discussion he noted that this is very positive and air reconnaissance has been a cornerstone of the RCAF; however, we must learn our lessons and maximize our performance today while we prepare for the future.

Major (retired) J.E. McLearn, All Source Intelligence Operations

Major (retired) John E. McLearn, CD, commenced his 43-year career in the Princess Louise Fusiliers in Halifax Nova Scotia later transferring to the Regular Force with the Royal Canadian Regiment and remastering to the Intelligence Branch where he would eventually command 3 Intelligence Company. He has served on over nine separate operations with the UN, NATO and ISAF as both an Infantry Officer and a Senior Canadian Intelligence Officer and Liaison Officer. In a telephone conversation he expressed this thoughts on the maximization of air reconnaissance sensors he stated that HUMINT an IA rely heavily on the information and

intelligence that they are able to ascertain amongst their teams and from organizations such as the ASIC. Their small party operations of less than section size, some as few as four members, are frequent and require multiple engagements with target audiences and sources to ensure mission success. In terms of CIMIC, mission success is the ability to ensure that projects are completed safely in a timely manner. In terms of HUMINT, mission success is the ability to obtain critical mission relevant information from trusted sources. In terms of PSYOPS, mission success is the ability to determine the effectiveness of operations on target audiences. Each of these teams need a clear understanding of whether their mission was successful and conduct further plans and missions based on the feedback they receive. The perishability of information between humans on very small sixed missions is high and a persistent surveillance providing information in real time that has some preliminary analysis would have significant impact. Major (retired) McLearn also noted that this same argument can be further expanded to include SOF, counter intelligence and every team of conventional soldiers on operations from commanding convoys through to troops-in-contact. The critical elements are the ability to have the right information to the right people at the right time, in essence, timely, relevant information that has been processed in order to determine whether there are additional considerations that must be added to the incoming information from the CP140 EO/IR whenever time permits. By having people providing preliminary information from the aircraft in real time by communicating directly to the ground would yield significant results.

Major McLearn also stated that there are relatively few CP140 Auroras available to support operations due to training, maintenance and other demands on the platform let alone the cost to operate the aircraft. I noted the cost per flying hour to which he noted that in order to maximize results from the capabilities of the sensors, strict operating procedures will have to be

developed such that the aircraft will be requests for a particular timeframe; however, the airframe should not be expected to be on station beyond what it should reasonably have to in order to accomplish a mission. He noted that the ASIC must conduct very detailed ICPs and associated ISTAR Plans so as to not waste reconnaissance time and, as a system of systems, to not forget the other systems that can perform similar duties so that every mission is tailored to the capabilities of the particular systems with the overlap necessary for verification to avoid single source information.

Major McLearn spoke about other types of support, in particular UN missions and noted that the involvement of a CP140 would be a significant investment by Canada and comes with Operational Security (OPSEC) risks, interoperability with other forces and the size of current UN missions supported would not justify its inclusion.

This being stated, he also noted that, for intelligence personnel, capabilities, such as the information obtained through the EO/IR that could be preliminary assessed by the crew on top of the target, transmitted to the ASIC and HUMINT or IA personnel on operation concurrently would provide the situational awareness needed by all. He spoke about his deployment in Central America as the *de facto* Chief of Staff on the operation and that one is never entirely sure who they are really dealing with and more information is invaluable as it helps one understand who they can place trust in, the actual performance of the assistance and predict issues. He also noted that the CP140, commonly seen as a ‘spy aircraft’ these days, may not be permitted by the host nations that are involved in the UN mission due to a variety of reasons from criminal activities through to international reputation or even concerns from their people about their own privacy.

Lieutenant L.A. Watson, Influence Activities Officer

Lieutenant L.A. Watson, a current CIMIC Operator, commenced his career in the Canadian Army in 36 Service Battalion and is currently a CIMIC Officer for 41 CBG Influence Activities Company. He is directly involved in IA and noted that one of the areas that Canadian IA is concerned with are the measurements of success when assessing whether an operation met the intent. Measurements of success are broken into two types, performance and effect. Lieutenant Watson stated that the IA community, particularly PSYOPS and CIMC are good at measuring performance in terms of 'did we hand out the quantity of pamphlets that we intended to the target audience that we are trying to reach' or 'have we completed digging a well for a particular community as we agreed with their leadership'. He noted that in each case there is an easily measurable activity. He also noted that they do not engage air reconnaissance and that the aircraft that would be used would be to deliver PSYOPS leaflets. He noted that when planning IA operations, there is also the need to know whether desired effect was achieved. For example, 'did the behavior of the community change in the manner desired?', 'was the message understood?' or even 'did the target audience start moving from place A to place B as indicated on a poster that was pinned-up in the local market?'. With each of these there is the requirement for prolonged observation to see changes in behavior, without triggering the observer effect and have a biased result.[96] In some cases a team may never get to learn about whom speaks to whom

[96] "The Hawthorne effect (also referred to as the observer effect or viewing effect) is where individuals modify or improve an aspect of their behaviour in response to their awareness of being observed. The term was coined in 1950 by Henry A. Landsberger, when analysing earlier experiments from 1924-32 at the Hawthorne Works (a factory outside Chicago). The original study, which was designed to investigate the effect of different lighting levels on workers' productivity, suggested that the experience of being a research subject per se could lead to productivity changes, irrespective of the lighting level. This has important implications for market research, where the experience of being viewed, or even of being researched, has the potential to alter the participant's feelings about the subject under discussion." The Association for Qualitative Research, http://www.aqr.org.uk/glossary/?term=observereffect. Internet; Accessed 29 December, 2015.

and the overall effect as there are not any resources resident within the IACC to accurately measure the effect of one of their activities.

He acknowledged that SIGINT and HUMINT have supporting roles that help narrow the gap to understand the effectiveness; however, persistent observation would help fill that gap and give real-time information and intelligence to understand success and follow-on/up planning. Having a CP140 with the capabilities provided by the MX-20, coupled with processing through the ASIC to add the HUMINT, SIGINT or other information and intelligence that may have been obtained from sensors such as infantry reconnaissance patrols would give the IA staff a stronger sense of what they must do to meet the commander's mission. The IA operations would be more surgical and more synchronized with the overall mission. He noted that closer working relationships with the Influence Activities Coordination Centre (IACC) and the ASIC would allow the information from the MX-20 to be relayed more quickly to the planners and the IA teams. His was concerned that the ASIC is already full in terms of number of analysts and would not have room or the desire to work with IA personnel who are not trained at the same level as intelligence analysts. He also noted that reservist IA personnel do not normally have TSSA clearances as they do not normally require this level. The TSSA is necessary to work in the ASIC as the information and intelligence used within the facility range from unclassified open sources through to very sensitive sources. He felt that, of all the IA groups that would benefit from working with the ASIC and having information from the CP140, it would be the PSYOPS personnel and not necessarily the CIMIC as the former is far more aligned with the Intelligence trade and the impact of their missions is more immediate.

Warrant Officer K. Mendioroz, Intelligence Fusion Analyst

Warrant Officer K. Mendioroz, MSM, CD (Intelligence Analysis – Fusion), commenced his career in the Canadian Army with the 1st Royal Canadian Horse Artillery and later transferring to the Intelligence Branch serving three tours in Afghanistan, one with the Field Artillery and the following two in the ASIC and ISAF HQ Intelligence. In discussion with him he was interested in the manner by which the information would be transmitted to the ASIC. This incoming information should have a position dedicated to the receipt and processing through the intelligence cell. He was concerned that there could be the request for unfiltered information directly to front line soldiers and information overload on already task saturated people; however, in emergency situations this type of information could be key to mission success, protection of resources or lives of our soldiers. Within the ASIC, the fusion analysts would add significant value to the common operating picture via the fusion of multiple sources such as SIGINT, HUMINT, IMINT and others bearing in mind the time sensitivity of effort to have relevant and timely information to the respective commander. Another point he noted was that a serious shortcoming of many systems is bandwidth and, though the sensors may capture vital information, the information pipeline is so constrained that it may not reach an end-user in a timely fashion. He noted that the CFJIC PED is dealing with this issue now and that the sensors outpace the available bandwidth thus delaying final intelligence product when, with an increased bandwidth, it would be faster to obtain. WO Mendioroz noted that, the training and exercising of these capabilities should be treated as every discipline within the CAF, recorded, and practiced while concurrently, ensuring that the communications links between sensors to analyst be fixed or, that the ASIC and PED advise the operational community that, with X-amount of bandwidth

equates to the following capabilities acknowledging that bandwidth is a shared resource amongst the entire operational contingent. He too acknowledged that the HUMINT and IA teams would benefit but would have to have training to understand what they are looking for, what they are looking at when the product arrives and have appropriate reactions to each.

Throughout these discussions, it was readily apparent that this topic area is of great interest and that, in terms of the CP140M, there are both opportunities and risks associated with the continual demand on their fleet from multiple users. The discussions identified that the CP140 has a much greater role and meaning to the CAF and could be the test-bed to learn how to conduct air reconnaissance in a manner far beyond previous missions and to take this time to 'get it right.'[97]

[97] Major John McLearn, 04 December 2015.

CHAPTER SEVEN

CONCLUSIONS AND RECOMMENDATIONS

Based on the study, there is the opportunity and need to make better use of existing capabilities within the CAF particularly leveraging HUMINT and IA operations through CP140 and ASIC support to obtain a desired effect by having near real-time, fused intelligence products including the identification of patterns and trends over a longer period of time. As identified in the project, many of these skill sets exist and are regularly practices and trained within their own silos. On recent operations including *Mobile* and *Impact* the importance of the surveillance and communications bolstered by the endurance of the CP140 is being realized and, in terms of HUMINT, ASIC and IA, pulling together all four pieces and establishing the system. Both the Intelligence and IA specialists are concerned with many human factors, behaviors, having a broader understanding of a community's pattern of life and knowing a person of interest in greater detail while concurrently appreciating the perishability of information associated with these. The upgraded CP140 sensors provides a capability that can provide greater insight and fused information that addresses each of these; however, the significant costs associated with the aircraft, few airframes and the multiple stakeholders it has to perform other roles indicates that they will not be deployed on every operation. With any evolution there comes a degree of risk such as the risk of being too costly; however, in the case of this study, the development and enhancement of this capability within the existing training structure is achievable and, as protocols are developed to assess whether the deployment of the CP140 to a particular mission is appropriate, that the overall team will be trained and familiar with proper employment of the aircraft, communications and planning. CFINTCOM could potentially have a lead role with the RCAF and IA communities.

RECOMMENDATIONS

Based on the research, there are a number of recommendations that may be made to facilitate the improvement of Human Intelligence and Influence Activity Operations through the fusion of information provided by CP140 sensors to an ASIC. I make five recommendations as follows:

Recommendation One: Integration of Air Reconnaissance into the ASIC

CFINTCOM should ensure that any operational ASIC includes consideration for air reconnaissance data processing through to the operational community as a permanent part of its architecture if the assets are deployed with dedicated training at the CFSMI and the predeployment training for operations. It is recommended that the continued training and use of the Air Reconnaissance assets, in particular the CP140 Aurora Aircraft, be researched in efforts to establish platform specific standard operating procedures by which the data can be collected, processed and disseminated expeditiously as the perishability of certain types of information gathered may be very high. The training should take into consideration that many of the missions that utilize the air reconnaissance information will be land based and therefore, training on this aspect should not be solely for Intelligence Officers and Non-Commissioned Members of the RCAF but include all three Elements of the CAF. Coupled with this is the necessity to ensure that when operations require the deployment of an ASIC, that the air reconnaissance aspect is considered a requirement. A request would then be made for the provision of support from the RCAF CP140 and the necessary infrastructure be made available within the physical ASIC for a

section dedicated to receive information and fuse it with the other information and intelligence available.

Recommendation Two: Integration of the IACC into the ASIC

Throughout the study, especially the discussions, it became apparent that information and intelligence should be pooled into one organization and, through discussions there seemed to be two organizations. Though a broader issue than support from the CP140M, the IACC should be integrated into the ASIC in order to ensure that the operational community receives its intelligence from one source vice multiple sources. This recommendation includes several sub-level recommendations including the requirement to screen IA Operators to the TSSA Level as a requirement of the specialty as it is with the Intelligence trade. That there is regular training with the Intelligence, IA and air reconnaissance communities within both the Primary Reserves and the Regular Force to galvanize the relationship and allow for greater communication and the provision of timely intelligence. Serious consideration should be made to make PSYOPS and CIMIC IA part of the Regular Force in an existing unit, e.g. a dedicated Platoon within the Infantry Battalions or a separate unit that could be assigned to each Division of the Canadian Army or even be a unit under the CFINTCOM as found in similar structures within the Five-Eyes community such as the current structures in place in the United Kingdom, Australia and New Zealand. In these instances there may be a requirement to cleave CIMIC, Media Ops and other IA assets away from PSYOPS that could become a specialty within the Intelligence Trade. Whatever the permutation, the importance of the operational community having one source of intelligence, integrated training and permanency through the Regular Force remains. The

separate IACC and ASIC will continue to introduce risk of unintentional disinformation and misinformation as well as timely dissemination and that ultimately impacts the operational community and maximization of combat effectiveness, especially if the centers disagree on a particular activity.

Recommendation Three: Expand Air Reconnaissance in the RCAF

It is recommended that the RCAF look at additional platforms that can embody the EO/IR whether additional CP140Ms brought into service through the procurement of existing P3C *Orion* aircraft from other nation's fleets or a separate and distinct airframe that could provide persistent surveillance with either the MX-20 or another system that would provide the same accuracy and detail. Throughout the study it was revealed that there is a demand for air reconnaissance that can be provided by the modernized CP140M. With the few platforms available to the operational community for several significant roles and operations that are currently ongoing by the CAF that strict protocols be established for their employment. The CP140, as a strategic ISR platform, should be continuously assessed in terms of the ability to operation a given mission, the risk posed to the aircraft from threats such as man-portable anti-aircraft systems in a theatre of operation and availability due to concurrent missions or training requirements. In this vein, similar to the P3C *Orion* AIP, consideration be given to other upgrades such as the integration of the AGM-65 IR *Maverick* Missile to bring additional capability to the overall effort and provide commander another option should a target be selected to be engaged.

Recommendation Four: Increase Support to other Canadian Departments and Agencies

It is recommended that the CAF look at the support that can be provided to other government departments such as the RCMP, the CSIS, Transportation Canada, the Department of Fisheries and Oceans (in particular the Canadian Coast Guard) and the Canadian Border Services Agency. This cross-pollination could also allow for additional research and development and potential placement of the MX-20 on other aircraft, buildings, vessels such that there can be the opportunity to develop more comprehensive operational procedures for employment, standardized communication amongst Departments and the development of a multi-agency common operating picture. Key Canadian infrastructure could house these sensors such as Parliament; however, it should be also noted that issues such as privacy laws, protection of the equipment and classification of the information observed must be thoroughly assessed, procedures established to ensure lawful operation and classification of information obtained strictly adhered to.

Recommendation Five: Expand Air Reconnaissance to UN Peacekeeping Missions

As the use of the CP140 for surveillance missions increase over land, that other missions such as United Nations Peacekeeping missions be considered they typically involve continuous observation of multiple parties that the force may have no prior knowledge of. This would, similar to other missions, provide the situational awareness that commander's require for decision making and help identify the intent and agenda of people from either party who the UN interacts with, the success of the provision of aid, a better understanding of which communities

require the aid in priority and the determination of route travel-ability, security and others. The list of potential uses is far greater; however, one must bear in mind that many of the contributing nations may not have the same technology yet have interest in the CP140 thus raising the question of OPSEC. This would have to be a consideration for the aircrew and the squadron, PED, Intelligence Section and all Canadian participants on a mission. The CP140 contains equipment that is highly classified and under separate technological security agreements that our Allies, e.g. the United States, have great interest in protecting. The CP140M would be a very significant contribution to many UN Peacekeeping missions; however, it must be acknowledged that, though air platforms for ISR are permissible on UN Missions,[98] Canadian and international media have painted the aircraft as a 'spy plane' publically and other nations would likely be aware and potentially concerned.[99] In addition, the cost to operate a CP140M would be too expensive for a United Nations operation.

POTENTIAL FUTURE RESEARCH

It is recommended that further studies be conducted, not only on the technology such as increasing bandwidth, processing of information through the ASIC to usable intelligence to the operational community but also what other systems can be added to the CP140. As well, greater research should be conducted to look at the role a CP140 could have on other operations such as UN Peacekeeping, especially if the CAF starts to move back to supporting these missions to a

[98] Walter Dorn. *United Nations Peacekeeping Intelligence*, http://walterdorn.net/79. Internet; accessed 01 December 2015.
[99] CTV News. Michelle Zillio. *Canada asked to keep spy planes, refuelling aircraft in ISIS fight: Dion*. http://www.ctvnews.ca/politics/canada-asked-to-keep-spy-planes-refuelling-aircraft-in-isis-fight-dion-1.2698444. Internet; accessed 13 December 2015.

greater extent. This research should also include what processing organizations should accompany the aircraft such as solely a PED or an Air Intelligence Section. Finally, given the capability and the increased interest in the Canadian Arctic, research could be conducted to look at how the sensors could be further employed on similar missions that the CP140A *Arcturus* conducted for greater situational awareness of the North, the impacts to the territory due to climate change and greater ability to navigate the waters as demonstrated by the RCN in the summer of 2015 when two Maritime Coastal Defence Vessels travelled into the Arctic Circle for the first time in over 65-years on Operation *Nanook.*[100]

The results of this study are based on information obtained through research of existing documents and several informal discussions with individual operators from several of the communities' studied. Each contributor was very positive about the capability and realistic in terms of the risk associated with the limited number of airframes, the type of operations that would be conducive to the CP140 conducting persistent surveillance, the lack of defensive equipment for the aircraft and the competition amongst various communities including traditional MPA, ASW and SAR that have a far longer and stronger bond to the CP140 community than land operations, let alone meeting the maintenance requirements. It was identified by many that any further evolution would be on a smaller scale and remain predominantly in Canada. Though limitations were certainly in place, physically, geographically and due to security requirements, they were mostly overcome through the recognition that almost

[100] Canadian American Strategic Review. *Operation Nanook 2015 – Esquimalt-based Kingston class MCDVs of Canada's Fleet Pacific took part in annual Arctic military exercise*. http://www.casr.ca/doc-dnd-nanook-2015-kingston-class.htm, Internet; accessed 25 November 2015.

everything is in place to evolve the capability and there is a desire to do so by the operational community.[101,102,103]

SUMMARY

In this chapter, the findings of the research were identified that there is the ability to improve the use of air reconnaissance between four separate but related capabilities, the post-AIMP CP140 *Aurora*, HUMINT, IA and the ASIC none of which either existed or had matured to the point that they are today. The CP140 is now capable to obtain through its upgraded sensors, provide preliminary analysis and fused information, in particular information obtained by the EO/IR, and communicate with the ASIC for greater fusion from all sources. This capability provides the potential to improve the overall effect of HUMINT and IA operations heavily reliant on perishable information that can be obtained through persistent surveillance, day and night. The preliminary analysis by the crew on the aircraft by fusing it with existing data so that it is value added and may be used in near real-time. HUMINT and IA, particularly PSYOPS, deal with people and communities that are multi-faceted and have more unknowns than knowns. There is also the ability to have greater fusion of the information through the ASIC that includes far greater intelligence and information resources that could be contained on the CP140. Therefore, at present there is a capability to maximize the integration of air

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[101] Captain Daniel Arseneault and Captain Josh Christianson, *Punching Above Its Weight: The CP140 Experience within Task Force Libeccio and Operation Mobile*. (The Royal Canadian Air Force Journal, Volume 1, No. 3, Summer 2012), 36.
[102] Captain Alan Lockerby. "SCAR-C Over Libya - To War in an Aurora", Canadian Military Journal Vol. 12, No. 3, (Summer 2012) 67.
[103] CTV News. Michelle Zillio. *Canada asked to keep spy planes, refueling aircraft in ISIS fight: Dion*. http://www.ctvnews.ca/politics/canada-asked-to-keep-spy-planes-refuelling-aircraft-in-isis-fight-dion-1.2698444. Internet; accessed 13 December 2015.

reconnaissance with HUMINT and IA through existing resources to have greater situational awareness with information fused on both the aircraft and the ASIC. This ability, to have fused information from an aerial platform over a target are with analysis on board is significant, especially when many operations that Canada is involved have a high degree of human interaction in the HUMINT and IA communities. The benefits of fused data is to have greater situational awareness of the linkages between different factors that impact the operations or have meaning to a particular mission in near real time rather than waiting for a report and having relevant information perish.

There are five recommendations that are a direct outcome of the research. In all instances there are several paths by which the use of the CP140 and its EO/IR can evolve to work with HUMINT and IA to produce more effective planning, decision making and operations while enhance the relationships and joint efforts amongst the military command as well as having the potential to increase the surveillance capabilities of Canada as a whole operating within Canada and abroad.

ANNEX 1

GLOSSARY

PART I – ABBREVIATIONS AND ACRONYMS

AIMP	Aurora Incremental Modernization Project
AIP	Anti-surface Warfare Improvement Program
APIS	Air Photo Interpretation School
ASIC	All Source Intelligence Centre
ASLEP	Aurora Structural Life Extension Project
ASW	Anti-Submarine Warfare
bps	Bits Per Second
CAF	Canadian Armed Forces
CBRN	Chemical, Biological, Radiation and Nuclear
CDU	Control Display Unit
CFB	Canadian Forces Base
CFINTCOM	Canadian Forces Intelligence Command
CFJIC	Canadian Forces Joint Imaging Centre
CIMIC	Civilian Military Cooperation
CMS	Communications Management System
COIN	Counter Insurgency
COMINT	Communications Intelligence
COMSEC	Communications Security
CONPLAN	Concept Plan
CS	Control System
DAMA	Demand Assigned Multiple Access
DMS	Data Management System
ELINT	Electronic Intelligence
EOIR	Electro-Optical Infra-Red
ESM	Electronic Support Measures
EW	Electronic Warfare
FM	Frequency Modulation
HF	High Frequency
HUMINT	Human Intelligence
IA	Influence Activities
IACC	Influence Activities Coordination Centre
ICAC	Intelligence Collection and Analysis Centre
ICD	Interface Control Document
ICS	Intercommunications System
IMINT	Imagery Intelligence
IMP	International Marine Products
INTREP	Intelligence Report
INTSUM	Intelligence Summary
IO	Information Operations
IR	Information Requirement
ISR	Intelligence, Surveillance and Reconnaissance

ISTAR	Intelligence Surveillance Target Acquisition and Reconnaissance
JAPIS	Joint Air Photo Interpretation School
kbps	Kilobits Per Second
kHz	Kilohertz
LOS	Line of Sight
LRP	Long Range Patrol
LRPA	Long Range Patrol Aircraft
MAD	Magnetic Anomaly Detector
MC	Mission Computer
MHz	Megahertz
MIL-STD	Military Standard
MMA	Multi-Mission Aircraft
MPA	Maritime Patrol Aircraft
NCE	National Command Element
NGS	Naval Gun Support
NSE	National Support Element
NFIMP	Navigation Flight Instruments Project
OEF	Operation Enduring Freedom
OEMS	Overland Electronic Missions Suite
OIF	Operation Iraqi Freedom
PED	Photographic Exploitation Detachment
PIR	Priority Intelligence Requirement
PR	Photographic Reconnaissance
PSYOPS	Psychological Operations
RAF	Royal Air Force
RAAF	Royal Australian Air Force
RCAF	Royal Canadian Air Force
RCMP	Royal Canadian Mounted Police
RCN	Royal Canadian Navy
RFI	Request for Information
SAR	Search and Rescue
SATCOM	Satellite Communications
SCAR	Strike Coordination and Armed Reconnaissance
SEAD	Suppression of Enemy Air Defence
SIGINT	Signals Intelligence
SKAD	Survival Kit—Air-Droppable
SOF	Special Operations Forces
SME	Subject Matter Expert
TRANSEC	Transmission Security
TSSA	Top Secret Special Access
UAV	Unmanned Aerial Vehicle
UHF	Ultrahigh Frequency
UN	United Nations
USAF	United States Air Force
USN	United States Navy
VHF	Very High Frequency

ANNEX 2

GLOSSARY

PART II – DEFINITIONS

All Source Intelligence: The intelligence products, organizations, and activities that incorporate all sources of information and intelligence, including open-source information, in the production of intelligence. All-source intelligence is a separate intelligence discipline, as well as the name of the function used to produce intelligence from multiple intelligence or information sources.[104]

Bandwidth: Is the measurement of the rate of data transferred, also known as bit rate or throughput, measured in bits per second (bps).

Civil-Military Cooperation (CIMIC): is a military function that supports the commander's mission by establishing and maintaining coordination and cooperation between the military force and civilian actors in the commander's area of operation.[105]

Communications Intelligence (COMINT): is intelligence derived from electromagnetic (EM) communications and communications systems by other than intended recipients.[106]

Communications Security (COMSEC): The protection resulting from all measures designed to deny unauthorized persons information of value that might be derived from the possession and study of telecommunications, or to mislead unauthorized persons in their interpretation of the results of such possession and study. [107]

Demand Assigned Multiple Access (DAMA): is a technology used to assign a channel to clients that don't need to use it constantly. DAMA systems assign communication channels based on requests issued from user terminals to a network control system. When the circuit is no longer in use, the channels are then returned to the central pool for reassignment to other users. DAMA is very effective in environments comprising multiple users each having a low to moderate usage profile. It is not available to other users in the network until their session is finished. DAMA is used in military environments due to the relative simplicity of implementation, ease of modeling and has the added advantage that it requires no special security or coordination hardware on the satellite. This allows the master and slave ground stations to be upgraded repeatedly to change or improve security and compression without requiring an expensive satellite replacement. [108]

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[104] United States Army, *FM 2-0 Chapter 5: All Source Intelligence*, (2011), 5-1.
[105] Major Graham M. Longhurst, *The Evolution of Canadian Civilian-Military Cooperation*, http://www.journal.forces.gc.ca/vo7/no4/longhurst-eng.asp. Internet; accessed 01 November 2015.
[106] Canada. Department of National Defence. B-GL-357-001/FP-001F, Land Force Information Operations Field Manual – Intelligence. (2001), 6.
[107] *Dictionary of Military and Associated Terms*. S.v. "COMSEC." http://www.thefreedictionary.com/COMSEC Internet; accessed 02 December 2015.
[108] Defence Information Systems Agency Joint Operability and Engineering, *Briefing on Set-Up and Communications Delays for all UHF SATCOM DAMA Modes of Operation* (Fort Monmouth, New Jersey, 23 June

Electronic Intelligence (ELINT): is the intelligence derived from EM and non-communication transmissions by other than intended recipients.[109]

Half-Duplex: In terms of telecommunications, the ability for devices to communicate from point to point in one direction at a time.

Human Intelligence (HUMINT): Is a category of intelligence derived from information collected and provided by human sources.[110]

Imagery Intelligence (IMINT): is intelligence derived from imagery acquired by photographic, radar, electro-optical, infra-red, thermal and multi-spectral sensors, which can be ground-based, seaborne or carried by overhead platforms.[111]

Influence Activities (IA): Influence Activities is the integration of designated information-related capabilities in order to synchronize themes, messages, and actions with operations to inform Canadian and global audiences, influence foreign audiences, and affect adversary and enemy decision making.[112]

Psychological Operations (PSYOPS): Planned operations to convey selected information and indicators to foreign audiences to influence their emotions, motives, objective reasoning, and ultimately the behavior of foreign governments, organizations, groups, and individuals. The purpose of psychological operations is to induce or reinforce foreign attitudes and behavior favorable to the originator's objectives.[113]

Signals Intelligence (SIGINT): Is the generic term used to describe COMINT and ELINT when there is no requirement to differentiate between these two categories of intelligence, or to represent fusion of the two.[114]

Transmission Security (TRANSEC): The component of communications security that results from all measures designed to protect transmissions from interception and exploitation by means other than cryptanalysis.[115]

1994). http://www.dtic.mil/mwg-internal/de5fs23hu73ds/progress?id=HQv-dolqiZYSxAsiXIe3hRPe3G-bEEwjMywt06_hKOQ. Internet; accessed 8 December 2015.

[109] Canada. Department of National Defence. B-GL-357-001/FP-001F, Land Force Information Operations Field Manual – Intelligence. (2001), 7.

[110] *Ibid.*

[111] *Ibid.*

[112] United States Army, *FM 3-13 Inform and Influence Activities Final Draft*, (2011), 1-1.

[113] Military.com, Psychological Warfare Definition, http://www.military.com/ContentFiles/techtv_update_PSYOPS.htm. Internet; accessed 12 November 2015.

[114] Canada. Department of National Defence. B-GL-357-001/FP-001F, Land Force Information Operations Field Manual – Intelligence. (2001), 8.

[115] *Dictionary of Military and Associated Terms*. S.v. "TRANSEC." http://www.thefreedictionary.com/TRANSEC Internet; accessed 02 December 2015.

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