National Defence Défense nationale

Canadian Forces College

Collège des Forces Canadiennes

MEGACITIES TO MEGABYTES: PREPARING THE INFORMATION OPERATIONS CAPABILITY CONTINUUM FOR FUTURE CONFLICT

Maj Shane C Myatt

JCSP 43 DL

Exercise *Solo Flight*

Disclaimer

Opinions expressed remain those of the author and do not represent Department of National Defence or Canadian Forces policy. This paper may not be used without written permission.

PCEMI 43 AD

Exercice *Solo Flight*

Avertissement

Les opinons exprimées n'engagent que leurs auteurs et ne reflètent aucunement des politiques du Ministère de la Défense nationale ou des Forces canadiennes. Ce papier ne peut être reproduit sans autorisation écrite.

Canada

CANADIAN FORCES COLLEGE – COLLÈGE DES FORCES CANADIENNES
JCSP 43 DL – PCEMI 43 AD
2017 – 2018

EXERCISE *SOLO FLIGHT* – EXERCICE *SOLO FLIGHT*

MEGACITIES TO MEGABYTES: PREPARING THE INFORMATION OPERATIONS CAPABILITY CONTINUUM FOR FUTURE CONFLICT

Maj Shane C Myatt

Word Count: 3184

Compte de mots: 3184

Megacities to Megabytes:
Preparing the Information Operations Capability Continuum for Future Conflict

"Intelligence is the ability to adapt to change."

- Stephen Hawking

The Canadian Armed Forces (CAF) are entering era of change that will profoundly impact the nature of conflict, and the foundation of the institution. This era will see the rapid transformation of both the operating environment and the capabilities needed to manage conflict. Moreover, this era will challenge the traditional notions of what it takes to be a soldier, and the expert skills and experience and attitudes—the meta-competencies—required to manage the needs of the operating environment.

This new era will see conflict occur increasingly in urban spaces, where conventional and unconventional threats actors will aspire for dominance of the operating environment. This era will place extraordinary pressure on the CAF to enhance certain *population-focused capabilities*, such as Information Operations (IO) to better address the hearts and minds aspect of conflict. Thus, Information Operators (including Public Affairs, CIMIC, Psychological Operations, Cyber Operations, Electronic Warfare Operations) will need to demonstrate the meta-competencies required to effectively engage adversaries as well as a wide range of urban audiences. Most importantly, Information Operators must have the meta-competencies to understand and adjust to the evolving needs of a complex battlespace. Thus, this new breed of Information Operator must be mentally and psychologically agile, culturally adaptable and intellectually capable.

In the past, the CAF has leveraged the professional versatility of its soldiers to sustain key capabilities such as IO. However, combined with the heightening wave of technical innovation that is on the horizon, the emerging complexities of future conflict will exceed the

professional versatility limits of volunteer Information Operators and drive a renewed impetus to transform the IO enrollment model to ensure that selected Information Operators possess the discrete and unique meta-competencies that meet or exceed the operating requirements of the post-Afghanistan era of conflict.

This paper will highlight the emerging complexities of the operating environment to illustrate the special competencies that will be required to adapt to future conflict. Next, the paper will make clear the competency challenges that technology, connectivity, the internet of things will present for Information Operators attempting to address population management needs. Finally, this paper will explain how the emerging complexities of conflict are challenging the professional versatility limits of Information Operators and emphasize the need to maximize the IO capabilities of CAF soldiers through a rigorous selection process.

META-COMPETENCY DEFINED

A competency is typically defined as the cogent integration of skills, knowledge and attitudes.[1]. The Ontario Public Service states that:

> *"A competency is more than just knowledge or skills. It involves the ability to meet complex demands, by drawing on and mobilizing psychosocial resources (including skills and attitudes) in a particular context. For example, the ability to communicate effectively is a competence that may draw on an individual's knowledge of language, practical IT skills and attitudes towards those with whom he or she is communicating."*[2]

[1] Ontario, Ontario Public Service. "Towards Defining 21st Century Competencies for Ontario: Foundation Document for Discussion" (Winter 2016) 2

[2] Ibid 4

Yet, Hall proposes the concept of *meta-competency*; a competency that is so powerful that it affects the person's ability to acquire other competencies.[3] The Oxford Reference describes a meta-competency as an 'overarching' competency that is relevant to a wide range of work settings and which facilitates adaptation and flexibility on the part of the organization. [4]

Meta-competence embraces higher order abilities which relate to being able to learn, adapt, anticipate and create. Berman Brown holds that meta-competencies are a prerequisite for the development of capacities such as judgement, intuition and acumen upon which competences are based and without which competencies cannot flourish.[5] Thus, meta-competencies are super competencies that—through the filter of skills, knowledge and attitudes—are concerned with the ability to cope with uncertainty.[6] From a military perspective, Wong describes several meta-competencies essential to military leadership, including Identity, Mental Agility, Cross-Cultural Savvy, Interpersonal Maturity, World-class Warrior, and Professional Astuteness.[7]

THE EMERGING COMPLEXITIES OF THE FUTURE OPERATING ENVIRONMENT

Clausewitz theorized that the forces that give rise to war are "the social conditions of . . . states themselves and their relationship to one another."[8] In contextualizing Clausewitz, Smith stated that "[w]ar and the prospect for war also release their own passions such as patriotism,

---

[3] Briscoe, Jon P., Hall, Douglas T.; "Grooming and Picking Leaders Using Competency Frameworks: Do They Work? An Alternative Approach and New Guidelines for Practice," (*Organizational Dynamics*, Autumn 1999) 38

[4] Oxford Online Reference. Oxford Dictionary of English (3 ed.) (Oxford University Press, 2015)

[5] Reva Berman Brown and Sean McCartney. "Competence is not enough: Meta-competence and Accounting Education" (Accounting Education Volume 4 (1) 1995) 1

[6] F. Delmare Le Deist and J Winterton. "What Is Competence?" (Human Resource Development International, Vol. 8, No. 1, 27 – 46, March 2005) 35

[7] Leonard Wong et al. "Strategic Leadership Competencies" (Report generated by U.S. Army War College for the Chief of Staff of the Army. Sep 2003) 5

[8] Hugh Smith. "Clausewitz as Sociologist". (Infinity Journal Special Edition: Clausewitz and Contemporary Conflict. February 2012) 13

xenophobia, the desire for vengeance or the quest for glory – all complex emotions that are felt by individuals but thoroughly shaped by social relationships."[9] Smith went further by saying that "Clausewitz was the first to embrace society as the very foundation of war"[10] and noted that many analysts are now coming to "emphasize the social factors in modern conflict – culture, sociology, psychology, anthropology, ethnography and the like."[11]

Just as Clausewitz argued that cultural factors are one of the most important aspects of war[12], Ng postulated that ". . . military leaders and soldiers. . . will increasingly be required to work with other national cultures and non-military organizations. . . Among the new competencies identified for leadership in the new operating environment is "cultural awareness" or "cultural competence"[13] Therefore, cultural intelligence meta-competencies will be required to address the population management needs of future operating environments.

Emerging Climate Change Impacts

Climate change will become increasingly pronounced and generate significant population tensions. With low-elevation coastal zones hosting approximately 13 per cent of the world's urban population[14], rising sea levels caused by climate change will impact these dense population centers, especially in third world countries. Moreover, other environmental conditions related to climate change—such as water scarcity—will put considerable stress on populations and

[9] Ibid 15
[10] Ibid 15
[11] Ibid 15
[12] Ibid 14
[13] Kok Yee Ng et al. "Cultural Intelligence: Its Potential for Military Leadership Development" (Paper produced for the Centre of Leadership Development, SAFTI Military Institute Singapore Armed Forces n.d.) 2
[14] United Nations. "Urbanization and Development: Emerging Futures" (UN World Cities Report 2016) 16

livestock as crops begin to fail.[15] Thus, environmental factors such as climate change will negatively impact global populations by disrupting the basic fabric and functioning of states and regions.

With the loss of food, water and other important resources, climate change will significantly contribute to the rapid urbanization of third world cities that is already occurring in Karachi and Dhaka in Asia, and Kinshasa and Lagos in Africa.[16] Referring to this phenomena, Evans states that "it is an indisputable reality that the world is urbanizing and that by 2050, two thirds of the human race will live in cities."[17] Therefore, conflict will occur increasingly in urban environments and demand a rich understanding of the cultural and social nuances that underpin the operating environment.

Emerging Urban Service Shortfalls

The rapid increase in urban populations has stretched , and will continue to test, the capacity of mega-city infrastructure to provide basic services.[18] Potable water supply, sanitation, solid waste management, urban transportation and energy are expected to fall far short of popular needs in less wealthy countries.[19] The UN World Cities Report 2016 indicated that "[a]lthough urbanization has the potential to make cities more prosperous and countries more developed, many cities all over the world are grossly unprepared for the multidimensional challenges

[15] Ibid 90
[16] Michael Evans. "Future War in Cities: Urbanization's Challenge to Strategic Studies in the 21st Century." (International Review of the Red Cross 98, (1), 2016) 40
[17] Ibid 38
[18] Michael Evans. "Future War in Cities: Urbanization's Challenge to Strategic Studies in the 21st Century." (International Review of the Red Cross 98, (1), 2016) 46
[19] United Nations. "Urbanization and Development: Emerging Futures" (UN World Cities Report 2016) 15

associated with urbanization."[20] If not effectively addressed, these service challenges will become a source of intra-mural tension that will pit community against community. Therefore, Information Operators must have the capability to quickly adapt to emerging population matters.

Most disturbingly, rapid urbanization has been associated with growing income and wealth inequality.[21] This trend has resulted from the increasing polarization, privatization and segmentation of urban spaces, and the segregation of low income groups.[22] Unfortunately, this trend will shape relations within future operating environments as the economic disparities between the 'haves' and the 'have nots' increase, and as urban resource scarcity breeds resentment. Thus, Information Operators must have the capacity to engage multiple audiences and interest groups.

Conclusion

The cultural tensions associated with urbanization will become more profound and wider in scope as the effects of climate change deepen. While some cities appear well-prepared to adapt to population pressures, Evans notes that "urban migration and city growth are seen as a prescription for growing anarchy, violent political breakdown and ecological decline throughout the developing world."[23] In responding these conflict scenarios, the CAF will be increasingly required to appreciate the cultural behaviors and values of diverse populations to better understand conflict and achieve operational outcomes.

---

[20] Ibid 5
[21] Ibid 19
[22] Ibid 19
[23] Michael Evans. "Future War in Cities: Urbanization's Challenge to Strategic Studies in the 21st Century." (International Review of the Red Cross 98, (1), 2016) 40

Thus, Information Operators must possess the meta-competencies that will allow them to cope with the cultural uncertainties related to the future operating environment, especially Cross-Cultural Savvy. The meta-competency Cross-Cultural Savvy includes the ability to understand cultures beyond one's organizational, economic, religious, societal, geographical, and political boundaries.[24] If Information Operators can effectively adjust to cultural uncertainty—and can make "culturally sound and effective tactical, operational and strategic decisions."[25]—the CAF will be more effective in addressing the population management challenges of the future operating environment.

TECHNOLOGY, INTERCONNECTIVITY AND THE INTERNET OF THINGS

Technology and Connectivity will shape every dimension of human relations and interaction. Assante and Bochman see [artificial] intelligence and connectivity being infused into everything[26]. They state that "much of our modern world—from households to businesses to industrially intensive operations—would cease to function if disconnected from cloud services for any length of time"[27] Similarly, the UN reports that connectivity has become vital to population governance by "supporting a much more collaborative relationship between city governments, citizens, and businesses.[28] Therefore, technology, interconnectivity, and the internet of things will have a close nexus to future conflict.

---

[24] Leonard Wong et al. "Strategic Leadership Competencies" (Report generated by U.S. Army War College for the Chief of Staff of the Army. Sep 2003) 7

[25] Kok Yee Ng et al. "Cultural Intelligence: Its Potential for Military Leadership Development" (Paper produced for the Centre of Leadership Development, SAFTI Military Institute Singapore Armed Forces n.d.) 9

[26] Micheal Assante and Andrew Bochman. "IoT, Autonomy and Megacities in 2025: A Dark Preview". (Center for Strategic and International Studies. Washington DC. April 2017) 2

[27] Ibid 15

[28] United Nations. "Urbanization and Development: Emerging Futures" (UN World Cities Report 2016) 45

Communications Technology and Infrastructure

Marginalized urban populations will use the internet of things to advance the issues and concerns that drive conflict. As routine communications are increasingly conducted on information sharing applications, culture, economics, religion and language have become inextricably bound by technology. Thus, the internet of things and technology will become a virtual lifeline for populations seeking to communicate their issues, while also trying to access diminishing services and resources. The IO effort to unwind and understand the social issues and concerns—the issues and concerns that may drive conflict—will require integrated communication networks and technologies, especially integration with the technology platforms and applications resident in the operating environment. Thus, Information Operators must have the technical prowess to adapt to the technology and communications needs of the operating environment.

The effective resolution of conflict will require deep scientific and technical proficiencies. Emerging technologies are enabling broad networks and reach; which also contain vast treasure troves of information, including metadata and big data. In attempting to understand the anatomy of armed violence, Evans states that correlation and causation must be carefully distinguished and separated.[29] That said, expert data science proficiencies will be required to leverage the metadata and big data associated with emerging technologies.[30] Thus, IO must engage data analytics to delineate social, cultural, economic and religious networks and trends, and better forecast changes in the operating environment.

[29] Michael Evans. "Future War in Cities: Urbanization's Challenge to Strategic Studies in the 21st Century." (International Review of the Red Cross 98, (1), 2016) 46

[30] HC Kemp. "Rethinking the Information Paradigm: The Future of Intelligence, Surveillance, and Reconnaissance in Contested Environments" (The Mitchell Forum. No18. Feb 2018) 6

Global connectivity will profoundly change the way conflict is characterized. Rugge states that social media "are increasingly relevant in shaping the public opinion." As cyber actors are now able leverage connectivity to propagate competing viewpoints, technology, interconnectivity and the internet of things will be utilized for manipulative purposes. Rugge also suggests that "[c]yberspace is a powerful multiplier of the destabilizing effects of manipulated information because it allows high connectivity . . . without intermediaries, and a total disregard for physical distance or national borders."[31] Thus, misinformation and deception operations targeted against specific audiences will become accepted activities that will be extensively leveraged by threat actors; and against which IO must be prepared to respond.

Countering Malicious Cyber Intent

Moreover, ubiquitous computing power and networking platforms will create unanticipated threat opportunities and vulnerabilities. Ehrhart postulates that cyber activities will contribute to the de-bounding of warfare because they blur or eliminate existing borders such as between war and peace, front and hinterland, state and non-state actors, civil and military, friend and foe, internal and external security by using irregular approaches and practices.[32]

Cyber-attacks and cyber weapons will become an increasingly popular tool in conflict. Rugge suggested that cyber-attacks will become increasingly prevalent during military operations to ensure "information dominance". Therefore, threat actors will use cyber-mediated activities to engage both civilian and military targets and create unexpected malicious effects that

[31] Fabio Rogge. "Mind Hacking: Information Warfare in the Cyber Age" (Analysis 319 January 2018) 2

[32] Hans-Georg Ehrhart. "Postmodern Warfare and the Blurred Boundaries Between War and Peace". (Defense & Security Analysis, 33:3, 263-275 14 Jul 2017) 266

further their political or military interests. Thus, Information Operators must have the technical capacity to adapt to these emerging threats.

Conclusion

Information Operators must be able to exploit multiple forms of technology, data, connectivity and the Internet of things to build effective relationships, propagate messages and counter the de-stabilizing effects of adversary cyber activity.[33] While technology may enable some forms of communication and liaison, Ehrhart postulates that these competencies are needed "to stabilize the target country and to win over the indigenous population."[34] Moreover, as each population will have language and technical preferences, the number of technology and capability permutations present in a given operating environment will demand that Information Operators be adaptable and agile thinkers - and technologists. That said, the Information Operators who can quickly adapt to these evolving technology challenges will enable the CAF to conduct successful operations.

Therefore, Military Information Operators must possess the meta-competencies that will allow them to quickly adapt to the emerging complexities of the future operating environment. These meta-competencies include Mental Agility and World Class Warrior.

Wong defined Mental Agility as "the ability to recognize changes in the environment; to determine what is new, what must be learned to be effective, and includes the learning process

[33] Thomas W O'Steen "Adapting to the Evolving Strategic Environment: Applying the Lessons of the Global War on Terror to Future Threats" (Features, Summer 2016) 34

[34] Hans-Georg Ehrhart. "Postmodern Warfare and the Blurred Boundaries Between War and Peace". (Defense & Security Analysis, 33:3, 263-275 14 Jul 2017) 265

that follows that determination, all performed to standard and with feedback."[35] To manage operational challenges, Mental Agility builds on the ability to scan and adjust learning and balances the cognitive complexity of problem sets with improvisation and lightness. In the same way, the World Class Warrior meta-competency is described as "the ability to understand the entire spectrum of operations at the strategic level to include theater strategy; campaign strategy; joint, interagency, and multinational operations; and the use of all the elements of national power and technology in the execution of national security strategy."[36]

COMPETENCIES REALIZED

Future conflict will generate increasingly complex military challenges. Therefore, the military will need individuals who are culturally aware, technologically sophisticated, and behaviorally flexible and who can learn new languages and skills and withstand new operational stresses. That said, getting and keeping the best people will remain a constant and critical need.

Meta-competencies are more than the sum of an individual's skills, knowledge or ability. Gallus notes that meta-competencies speak to more ingrained behaviors that are essential to success, including a soldiers' ability "to cope with ambiguity" and "to demonstrate adaptability and flexibility."[37] In essence, effectively selected meta-competencies lead to more resilient and resourceful soldiers. Thus, assessment, selection, placement, and job design—always key

[35] Leonard Wong et al. "Strategic Leadership Competencies" (Report generated by U.S. Army War College for the Chief of Staff of the Army. Sep 2003) 6

[36] Ibid 9

[37] Jessica A Gallus. "Cross-Cultural Competence in the Department of Defense: An Annotated Bibliography" (U.S. Army Research Institute for the Behavioral and Social Sciences. Department of the Army. April 2014) 67

features of large organizations—become even more important as operational complexity increases.[38]

Moving Forward

The new defence policy—Strong, Secure, Engaged (SSE)—has articulated the need to develop "military-specific information operations and offensive cyber operations capabilities able to target, exploit, influence, and attack in support of military operations."[39] The SSE vision is to develop a 21st Century military IO capability that will be able to respond to the emerging threat environment.

Unfortunately, fiscal realities have limited the implementation of this capability. Perry noted that DND had a long-term funding deficit that it needed to rectify to continue delivering on status quo Canadian defence policy.[40] As the CAF is experiencing a funding shortfall that will limit new investment in operational IO capabilities, it must re-purpose existing resources.

Capable Versus Questionable Performance Levels

However, the CAF has demonstrated an inability to meet the population management challenges of a conflict zone. Fully seven years into the Afghan conflict, key lessons learned reports still indicated a need for "greater cultural awareness training to smooth the interaction

[38] James J Blascovich and Christine R. Hartel, (Ed) Human Behavior in Military Contexts. (A Report of the National Research Council of the National Academies. National Academies Press. September 17, 2007) 1

[39] Canada. Department of National Defence. Strong Secure Engaged: Canadas Defence Policy. 2017 41

[40] Dave Perry. "A Primer on Recent Canadian Defence Budgeting Trends and Implications" (SPP Research Papers Volume 8 Issue 15. University of Calgary School of Public Policy. April 2015)

between soldiers of the CF and the Afghan population."[41] Clearly, soldiers were still unable to deliver population management effects that aligned with operating environment needs. One could easily postulate that the issue was not the training, rather the professional versatility of the soldier to adapt to unique cultural needs.

Most recently, the Information Operations selection and training process was exposed as inappropriate to CAF operational needs. In an recent Canadian Joint Operations Command (CJOC) briefing to senior Army appointments, Roach noted that Information Operators seconded to the Command were unable to adapt to the IO needs of Operation Reassurance.[42] More specifically, a number of senior Information Operators—experienced and qualified senior officers provided by the Influence Activities Task Force to support CJOC operations as a reach-back IO capability—were unable to adapt IO tactics, training and procedures to operational-level needs [43]. Both CJOC and SOFCOM articulated a pressing need for effective information operators; a need that was not being satisfied by the experience, qualifications *or the professional versatility of volunteer soldiers*. Rather, the required Information Operations competencies were more ingrained, with CJOC and SOFCOM being "very, very selective" [44] in who they will employ in the future.

---

[41] Canada, Lessons Synopsis Report (09-018) Expansion of the Stability Zone, Kingston: Department of National Defence, Army Lessons Learned Centre, January 2010.

[42] John Roach. "Canadian Army G9 Conference: CANSOF/CJOC Operational Perspectives" (Unclassified Brief to the Army G9 Conference. Peace Support Training Center Kingston Ontario. 24-25 March 2018) slide 22

[43] Ibid slide 22

[44] John Roach. "Canadian Army G9 Conference: CANSOF/CJOC Operational Perspectives" (Unclassified Brief to the Army G9 Conference. Peace Support Training Center Kingston Ontario. 24-25 March 2018) slide 22

Capable Resources Are Available

In the past, the CAF has achieved operating success by selecting soldiers whose competencies aligned to the operating requirements of conflict. Early in World War Two (WW2), Stacy noted that discussions "were undertaken between the [Canadian] Army and the R.C.A.F. [Royal Canadian Air Force] with a view to effecting an arrangement for the more efficient use of manpower. Irrespective of rank or trade qualifications, the R.C.A.F. needed men "of the highest category for aircrew".[45] These arrangements concentrated upon "the more effective utilization of those already serving, rather than upon the screening of personnel at the recruiting level". In the end, this effort enhanced the operating effectiveness of the RCAF not by creating more recruits (as manpower shortages were acute), rather by identifying and selecting soldiers with special skills and competencies. Having achieved "a very significant reduction in training failures"[46], this selection program was categorized as a striking success by the RCAF.

Conclusion

The CAF intends to build an Information Operations capability that will satisfy the needs of the future operating environment. However, that task will be completed under the lens of fiscal restraint. Fortunately, history has shown that special competencies do lie within the ranks of the CAF. The staffing challenge for Information Operations will be to identify and screen suitable Information Operators who will meet the operating challenges of the future.

---

[45] C. P Stacy. Arms Men and Governments; The War Polices of Canada 1939-1945 (Published by Authority of the Minister of National Defence. The Queen's Printer for Canada. Ottawa, 1970) 417

[46] Ibid 419

CONCLUSION

The nature of conflict is changing and we must adapt. As third world states and civil structures become increasingly incapable of managing popular needs, Kent estimates that 700 million people will become refugees, economic migrants or internally displaced.[47] The increasing urbanization of these disaffected populations[48], combined with a lack of basic urban infrastructure and services[49], will lead to large-scale social unrest that may fuel conflict.

In describing future conflict in the global village as "the most complex of social policies."[50] Bebber postulates that operational success will be attributed to the party that attempts to know and understand their adversaries "on the most profound of levels."[51] Moreover, Ritter states that to effectively address the root causes of conflict "we will have to take into account the whole context of a problem".[52] Speaking on the specific manpower needs of future conflict, Blaskovich comments:

> "As military systems become more complex and demands on team members become greater, getting and keeping the best people remains a constant and critical need. The military needs individuals who are culturally aware, technologically sophisticated, and behaviorally flexible and who can learn new languages and skills and withstand new stressors. Assessment, selection, placement, and job design—always key features of large organizations—become even more important as complexity increases."[53]

---

[47] Randolph Kent. "The future of warfare: Are we ready?" (International Review of the Red Cross, 97 (900), 2015) 1346

[48] Michael Evans. "Future War in Cities: Urbanization's Challenge to Strategic Studies in the 21st Century." (International Review of the Red Cross 98, (1), 2016) 44

[49] United Nations. "Urbanization and Development: Emerging Futures" (UN World Cities Report 2016) 45

[50] Robert Bebber. Fleet Essay: "The Wicked Problem of War" (Research Gate Issue #5, July 2015) 2

[51] Ibid 2

[52] Ibid 4

[53] James J Blascovich and Christine R. Hartel, (Ed) Human Behavior in Military Contexts. (A Report of the National Research Council of the National Academies. National Academies Press. September 17, 2007) 1

Therefore, special competencies—meta-competencies that will allow soldiers to adapt to the cultural and technical needs of the operating environment—will be the key to success. Accordingly, this paper has shown that the meta-competencies of Cross Cultural Savvy, Mental Agility and World Class Warrior will address the unique IO needs of future conflict. The challenge is to identify and select the CAF members who possess these meta-competencies for employment as Information Operators. However, once deployed into conflict zones, the CAF will realize the value that these operators will provide in achieving operational outcomes.

In summary, this paper has proven that, combined with the heightening wave of technological innovation that is on the horizon, the emerging complexities of future conflict will exceed the professional versatility limits of volunteer Information Operators and drive a renewed impetus to transform the IO enrollment model to ensure that selected Information Operators possess the discrete and unique meta-competencies that meet or exceed the operating requirements of the post-Afghanistan era of conflict.

Bibliography

Assante, Micheal and Andrew Bochman. “IoT, Autonomy and Megacities in 2025: A Dark Preview”. Center for Strategic and International Studies. Washington DC. April 2017

Blascovich, James J. and Christine R. Hartel, (Ed) *Human Behavior in Military Contexts*. A Report of the National Research Council of the National Academies. National Academies Press. September 17, 2007

Bebber, Robert. Fleet Essay: "The Wicked Problem of War" *Research Gate* Issue #5, July 2015

Becker, B.E., and Huselid, M.A. “High performance work systems and firm performance: A synthesis of research and managerial implications”. *Research on Personnel and Human Resource Management*, 16 (1998).

Bowes, SJ. Memorandum 5400-1(DCOS JOE/RDMIS 454464) “Letter of Appreciation For 33 Influence Activities Company Members of JTIC” 4 April 2018

Berman Brown, Reva and Sean McCartney. “Competence is not enough: Meta-competence and Accounting Education”. *Accounting Education* Volume 4 (1) 1995

Briscoe, Jon P., Hall, Douglas T.; “Grooming and Picking Leaders Using Competency Frameworks: Do They Work? An Alternative Approach and New Guidelines for Practice,” *Organizational Dynamics*, Autumn 1999

Canada. Department of National Defence. *Canadian Forces Aircrew Selection and Testing Candidate Guide.* Canadian Forces Aircrew Selection Centre 22 Jan 2015

Canada. Department of National Defence. “Defence Renewal Annual Report 2014-15: Frame work for Continuous Improvement” n.p. n.d.

Canada. Department of National Defence. *Capability-Based Planning Handbook.* June 2014

Canada. Department of National Defence. *Strong Secure Engaged: Canadas Defence Policy. 2017*

Canada. Department of National Defence. “CJOC and SOFCOM Brief on IO Force Employment Challenges”. Unclassified Brief by John Roach. CFB Kingston. March 2018

Canada, Department of National Defence, “Seeing Through the 'MIST:' The Military Information Support Team” The Bulletin, Vol. 4, No. 3, February 1998.

Canada, Lessons Synopsis Report (09-018) Expansion of the Stability Zone, Kingston: Department of National Defence, Army Lessons Learned Centre, January 2010.

Canada, Lesson Synopsis Report (LSR) (09-016) Stabilization Company- Kandahar Provincial Reconstruction Team (KPRT), Kingston: Department of National Defence, Army Lessons Learned Centre, January 2010.

Canada. Senate "Military Underfunded: The Walk Must Match the Talk." Report of the Standing Senate Committee on National Security and Defence. April 2017

Committee on the Context of Military Environments: Social and Organizational Factors. *The Context of Military Environments: An Agenda for Basic Research on Social and Organizational Factors Relevant to Small Units.* The National Academies Press. (2014)

Chapnick, Adam, Howard G. Coombs, David Last, Paul T. Mitchell, Pat Stogran. "Are Canada's Military Officers Smart Enough? A Debate". *The Dorchester Review* Sampler No. 4. Updated January 2018

Connor, Anne Marie. "An Investigation into the Use of Competency Frameworks for Recruitment and Selection in a Financial Services Organization in Dublin." Thesis Submitted to the National College of Ireland August 2016

Delmare Le Deist, F and J Winterton. "What Is Competence?" *Human Resource Development* International, Vol. 8, No. 1, 27 – 46, March 2005

Ehrhart, Hans-Georg. "Postmodern Warfare and the Blurred Boundaries Between War and Peace". *Defense & Security Analysis*, 33:3, 263-275 14 Jul 2017

Evans, Michael. "Future War in Cities: Urbanization's Challenge to Strategic Studies in the 21st Century." *International Review of the Red Cross 98,* (1), (2016)

Gallus, Jessica A. "Cross-Cultural Competence in the Department of Defense: An Annotated Bibliography" (U.S. Army Research Institute for the Behavioral and Social Sciences. Department of the Army. April 2014)

Green, Keith L. *Complex Adaptive Systems in Military Analysis.* Institute for Defense Analyses May 2011

Kalloniatis, Alexander, Iain Macleod, Phuong La "Bounding Wicked Problems: The C2 of Military Planning" Joint Operations Division Defence Science and Technology Organization, Canberra, Australia n.d.

Kemp, HC. “Rethinking the Information Paradigm: The Future of Intelligence, Surveillance, and Reconnaissance in Contested Environments” *The Mitchell Forum.* No18. Feb 2018

Kent, Randolph. “The future of warfare: Are we ready?” *International Review of the Red Cross*, 97 (900), 1341–1378 (2015)

Last, David. “Military Degrees: How High is the Bar and Where’s the Beef*?”. Canadian Military Journal.* Summer 2004

Lawton, Joel, Matthew Santaspirt, and Michael Crites. “Army Operations in Megacities and Dense Urban Areas: A Mad Scientist Perspective.” *Military Intelligence Professional Bulletin 42*, Iss. 3, (July 2016)

Ng, Kok Yee et al. “Cultural Intelligence: Its Potential for Military Leadership Development” Paper produced for the Centre of Leadership Development, SAFTI Military Institute Singapore Armed Forces n.d.

Nye, Joseph S. “Power and foreign policy”. *Journal of Political Power.* 4:1, 9-24 (2011)

Ontario, Ontario Public Service. “Towards Defining 21st Century Competencies for Ontario: Foundation Document for Discussion”. Winter 2016

O’Steen, Thomas W.” Adapting to the Evolving Strategic Environment Applying the Lessons of the Global War on Terror to Future Threats” *Features.* Summer 2016

Perry, David. “Dollars and Sense: The 2017 Defence Budget” *Canadian Naval Review*. Volume 13 (1) 2017

Perry, Dave “A Primer on Recent Canadian Defence Budgeting Trends and Implications” *SPP Research Papers* Volume 8 Issue 15. University of Calgary School of Public Policy. April 2015

Roach, John “Canadian Army G9 Conference: CANSOF/CJOC Operational Perspectives”. Unclassified Brief to the Army G9 Conference. Peace Support Training Center Kingston Ontario. 24-25 March 2018

Rogge, Fabio. “Mind Hacking: Information Warfare in the Cyber Age”. *Analysis* 319 January 2018

Stacy, C. P. *Arms Men and Governments; The War Polices of Canada 1939-1945.* Published by Authority of the Minister of National Defence. The Queen's Printer for Canada. Ottawa, 1970

Skorková, Zuzana. “Competency models in public sector”. 3rd International Conference on New Challenges in Management and Organization: Organization and Leadership, 2 May 2016, Dubai. UAE. *Procedia - Social and Behavioral Sciences* 230 (2016) 226 – 234

Smith, Hugh. “Clausewitz as Sociologist”. *Infinity Journal Special Edition: Clausewitz and Contemporary Conflict.* February 2012

United Nations. “Urbanization and Development: Emerging Futures”. UN World Cities Report 2016

Wong Leonard et al. “Strategic Leadership Competencies” Report generated by U.S. Army War College for the Chief of Staff of the Army. Sep 2003

Wyckoff, Kristin L. “Solving Homeland Security’s Wicked Problem: A Desigh Thinking Approach.” Thesis for Naval Post Graduate School September 2015

Zook, A. M. “Military Competency-Based Human Capital Management: A Step Toward the Future.” USAWC Strategy Research Project, U.S. Army War College Carlisle Barracks, Pennsylvania 2006