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ENGINEERING IN MODERN UN PEACE OPERATIONS: MORE THAN AN ENABLER

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INTRODUCTION

The United Nations (UN) is a fundamental organization of the international system.[1] Although peace operations were not a function foreseen by the original drafters of the UN Charter,[2] they have nevertheless emerged as one of the most visible actions of the UN. They are certainly amongst its most substantial contributions toward what the UN Charter terms "the maintenance of international peace and security."[3] Peace operation is an umbrella term that encompasses peacekeeping, peacemaking, peacebuilding, humanitarian assistance, and peace enforcement and prevention operations.[4] It can be defined as:

> the expeditionary use of uniformed personnel (troops, military observers/experts, and police), with or without a UN mandate, but with an explicit mandate to assist in the prevention of armed conflict by supporting a peace process; serve as an instrument to observe or assist in the implementation of ceasefires or peace agreements; or enforce ceasefires, peace agreements of the will of the UN Security Council (UNSC) in order to build stable peace.[5]

The UN is not the sole multilateral organization with security provisions that deploys forces on peace operations. Some of the regional organizations that have deployed troops on peace operations, including the North Atlantic Treaty Organization (NATO) in Bosnia-Herzegovina and Kosovo, the African Union (AU) in Burundi and Somalia, and the Economic

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[1]Kate Seaman, *UN-Tied Nations: The United Nations, Peacekeeping and Global Governance* (Surrey: Ashgate Publishing Limited, 2014), 11.

[2]Trevor Findlay, *The Use of Force in UN Peace Operations* (Oxford: Oxford University Press, 2002), 9.

[3]Joachim A. Koops *et al*, "Introduction: The United Nations and Peacekeeping," in *The Oxford Handbook of United Nations Peacekeeping Operations*, ed. Joachim A. Koops, Norrie MacQueen, Thierry Tardy, and Paul D. Williams (Oxford: Oxford University Press, 2015), 1.

[4]Dorn, *Keeping Watch*..., 18. This reference includes definitions of peacekeeping, peacemaking, etc.

[5]Alex J. Bellamy and Paul D. Williams, "Trends in Peace Operations, 1947-2013," in *The Oxford Handbook of United Nations Peacekeeping Operations*, ed. Joachim A. Koops, Norrie MacQueen, Thierry Tardy, and Paul D. Williams (Oxford: Oxford University Press, 2015), 13.

Community of West African States (ECOWAS) in Liberia, Sierra Leone, and Mali.[6] The UN has collaborated with these regional organizations on all of these and other peace operations. In addition, multinational peace operations can be initiated although not deployed through a multinational agreement, an example of which is the Multinational Force and Observers (MFO) deployed between Egypt and Israel since the early 1980s.[7] Yet, UN peace operations forces are the only operational bodies that can merge and utilize the great multitude of individual capabilities from all nations across the globe.[8] The UN has deployed a much higher number of operations, the largest and most complex missions have either been UN-led or at least UN-authorized, and they hold more "staying power" than all other peace operations actors.[9] Hence, UN peace operations are recognized as one of the foremost tools at the disposal of the international community to resolve conflicts.[10] See Table 1.1 for the current list of UN peace operations, on which almost 125,000 personnel are deployed.

Despite the UN's extensive experience in reacting to international crises, it struggles to achieve increasingly demanding mission mandates. As stated in the Report of the High-level Independent Panel on Peace Operations, released in June 2015, UN peace operations are more costly, deploying more personnel, and are operating within more complex environments than ever.[11] The vast majority of troops on current UN peace operations are deployed from

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[6]Paul F. Diehl and Alexandru Balas, *Peace Operations*, 2nd ed. (Cambridge: Polity Press, 2014), 85-92; Lise Marjé Howard, "Peacekeeping, Peace Enforcement, and UN Reform," *Georgetown Journal of International Affairs* 16, no. 2 (Summer/Fall 2015): 11.

[7]Diehl and Balas, *Peace Operations*..., 92-93.

[8]Ameerah Haq, "Challenges of 21st-Century Peace Operations in a United Nations Context," in *United Nations Peacekeeping Challenge: The Importance of the Integrated Approach*, ed. Anna Powles, Negar Partow, and Nick Nelson (Surrey: Ashgate Publishing Limited, 2015), 15.

[9]Bellamy and Williams, "Trends in Peace Operations..., 19-21, 25-29.

[10]Roméo Dallaire, "Forward," in *Keeping Watch: Monitoring, Technology & Innovation in UN Peace Operations*, by A. Walter Dorn (New York: United Nations University Press, 2011), xvii.

[11]United Nations, *Report of the High-level Independent Panel on Peace Operations on Uniting Our Strengths for Peace: Politics, Partnership, and People*, United Nations Document A/70/95 (New York: United Nations General Assembly, June 17, 2015), 21.

Table 1.1 – Current UN Peace Operations with Personnel Breakdown (as of 31 March 2016)

Mission Name	Active Since	Uniformed Personnel			Civilian Personnel	Volun-teers
		Troops	Military Observers	Police		
United Nations Mission for the Referendum in Western Sahara (MINURSO)	1991	27	205	0	241	4
United Nations Multidimensional Integrated Stabilization Mission in the Central African Republic (MINUSCA)	2014	9,799	151	1,896	760	184
United Nations Multidimensional Integrated Stabilization Mission in Mali (MINUSMA)	2013	10,808	40	1,100	1,246	155
United Nations Stabilization Mission in Haiti (MINUSTAH)	2004	2,366	0	2,533	1,245	96
United Nations Organization Stabilization Mission in the Democratic Republic of the Congo (MONUSCO)	2010	16,936	456	1,245	3,470	399
African Union-United Nations Hybrid Operation in Darfur (UNAMID)	2007	14,294	174	2,934	3,412	159
United Nations Disengagement Observer Force (UNDOF)	1974	813	0	0	140	0
United Nations Peacekeeping Force in Cyprus (UNFICYP)	1964	995	0	68	151	0
United Nations Interim Force in Lebanon (UNIFIL)	1978	10,598	0	0	848	0
United Nations Interim Security Force for Abyei (UNISFA)	2011	4,398	127	17	202	32
United Nations Mission in the Republic of South Sudan (UNMISS)	2011	12,109	184	1,197	1,973	441
United Nations Operation in Côte d'Ivoire (UNOCI)	2004	3,811	182	1,354	961	137
United Nations Interim Administration Mission in Kosovo (UNMIK)	1999	0	8	8	328	24
United Nations Mission in Liberia (UNMIL)	2003	2,592	71	1.082	1,159	178
United Nations Military Observer Group in India and Pakistan (UNMOGIP)	1949	0	44	0	72	0
United Nations Truce Supervision Organization (UNTSO)	1948	0	151	0	234	0
Totals		**89,546**	**13,434**	**1,793**	**16,471**	**1,809**

Source: United Nations, "Peacekeeping Fact Sheet," accessed 3 April 2016, http://www.un.org/en/peacekeeping/resources/statistics/factsheet.shtml.

developing nations who experience far greater deficiencies in training and equipment than developed nations. In the traditional peacekeeping operations of the Cold War era, most peace operations commenced following the end of hostilities and the signing of a comprehensive peace agreement. Today, a growing number of peace operations are deployed across vast, remote, austere, infrastructure-poor environments where no peace agreements are in force or desired. In these environments, the UN is challenged to maintain a robust presence and logistical support is typically stretched thin and susceptible to disruption.[12] These challenges are compounded in many missions, such as in Mali and Somalia, by the continuous threat of deadly attacks from insurgent groups. Over 80 percent of UN peace operations personnel are presently deployed to Africa.[13] Several of these missions are struggling to reach their objectives.[14]

The challenges faced by contemporary UN peace operations are significantly amplified by persistent deficiencies in key specialized capabilities, including engineering, medical, aviation, and logistical personnel and assets.[15] These assets are sometimes termed "enablers" by the UN and commentators because of their unique capabilities to provide essential assistance to the mission and its supported forces (such as infantry and intelligence, surveillance, and reconnaissance (ISR) troops) in accomplishing their tasks. These assets are often in highest demand and in greatest shortage for UN peace operations, leading to substantially diminished

[12]United Nations, *Report of the High-level Independent Panel*..., 21.

[13]United Nations, "Peacekeeping Fact Sheet," accessed 3 April 2016, http://www.un.org/en/peacekeeping/resources/statistics/factsheet.shtml.

[14]Paul D. Williams, "Keeping a Piece of Peacekeeping: The United States Doubles Down at the United Nations," *Foreign Affairs*, last modified 5 October 2015, https://www.foreignaffairs.com/articles/2015-10-06/keeping-piece-peacekeeping.

[15]United Nations, "Uniformed Capability Requirements for UN Peacekeeping: Current Gaps, Commitments to Enable More Rapid Deployment, and other Capability Requirements," last modified 24 August 2015, https://cc.unlb.org/Uniformed%20Capability%20Requirement%20Paper/UN%20PK%20Capability%20Requirements%20Paper%20-%20Rev%2024%20Aug%202015.pdf.

prospects for mission success. As a result, UN peace operations are facing an ever-increasing capacity challenge that demands stronger collaboration and innovation from Member States.[16]

Engineering has proven itself as one of the most crucial elements for achieving success during a UN peace operation. Essential from mission start-up to termination, it employs a combination of military, civilian, and commercial capabilities to accomplish its myriad tasks. Yet, it has perhaps received the least amount of critical attention.[17] For contemporary UN peace operations, engineering is a vital function across mission assistance, host nation assistance and capacity building, stabilization, humanitarian assistance, and development tasks. Furthermore, little has been reported about the role of engineering in these tasks or the particular challenges confronting the UN regarding force generation and employment of properly trained and equipped military engineering capabilities. In many regards, the few lengthy investigations on the role of engineering in peace operations are limited in scope.

This study takes a broad perspective on the role of engineering on UN peace operations, encompassing the full range of engineering capabilities with numerous historical examples. In addition, general operational and engineering-specific lessons-learned by other peace operations actors or field operations (e.g., 1991 Gulf War and counterinsurgency in Afghanistan) are introduced to best inform recommendations for the future. Also, the increasingly crucial role of engineering on UN peace operations will be shown, and in opposition to current prevailing classification, this study will assert that engineering has a role greater than simply one of an

[16]Anna Powles, Negar Partow, and Nick Nelson, "Introduction," in *United Nations Peacekeeping Challenge: The Importance of the Integrated Approach*, ed. Anna Powles, Negar Partow, and Nick Nelson (Surrey: Ashgate Publishing Limited, 2015), 1.

[17]Arthur Boutellis and Adam C. Smith, *Engineering Peace: The Critical Role of Engineers in UN Peacekeeping* (New York: International Peace Institute, January 2014), 1.

enabler or supporter to other forces. Engineering has a leading role in many aspects or phases of missions during which it requires support from what are traditionally considered supported functions. Furthermore, it is appropriate to recognize the importance of engineering by referring to countries that provide these specialized troops as "engineering contributing countries", or "ECCs." Currently, developing nations currently carry much of the burden for providing engineering capabilities for peace operations. This study will assert that developed nations ought to increase their level of participation as ECCs in the following ways: (i) direct mission participation and (ii) collective partnerships to help developing nations. In both these cases, developed nations can leverage sustainable engineering technologies to reduce financial costs, logistical burdens, and environmental impacts of missions. As Prime Minister Trudeau's recently elected Liberal government declared its intent to reinvigorate Canada's national role in UN peace operations, this study contends that Canada need not contribute thousands of troops across numerous trades to these operations as it did in the 1990s. It can provide fewer troops. In addition to other possible contributions, Canada could leverage its comparative advantage in military engineering expertise to provide pressingly needed global leadership in this operationally critical domain.

THE PRECARIOUS STATE OF CONTEMPORARY UN PEACE OPERATIONS

Today, not only are peace operations one of the most challenging actions undertaken by the UN,[18] they have proven to be amongst the most challenging of all military operations.[19] UN

[18]Haq, "Challenges of 21st-Century Peace Operations…, 7.

[19]Donald C.F. Daniel, "Why So Few Troops From Among So Many?," in *Peace Operations: Trends, Progress, and Prospects*, ed. Donald C.F. Daniel, Patricia Taft, and Sharon Wiharta (Washington, DC: Georgetown University Press, 2008), 47.

peace operations have occasionally garnered acclaim, but are more often maligned.[20] Criticism was particularly acute following the failures of the early 1990s in Somalia, Bosnia, and Rwanda,[21] which provided substantial impetus for the UN to conduct a major analysis for improving the conduct of peace operations in the late 1990s. The UN subsequently created the Panel on United Nations Peace Operations, that later published their report, best known as the Brahimi Report after the Panel's chair, Lakhdar Brahimi, in August 2000.[22] However, challenges continued to plague UN peace operations, some persistent, others new. Approximately 15 years later, the UN commissioned another panel, culminating in the 2015 Report of the High-level Independent Panel of Peace Operations (HIPPO). According to these reports, effective undertaking of UN peace operations have been continuously obstructed by at least three broad and persistent challenges: (i) ever-increasing complexity in operational demands, (ii) inconsistent political and/or material support from the UN Security Council (UNSC) and Member States, and (iii) inadequate institutional structure to permit rapid deployment and management of large multinational operations.[23]

Increasing Complexity of UN Peace Operations

The mandates, functions, frameworks, missions, and tasks of UN peace operations have significantly evolved over time.[24] In total, the UN has created 71 peace operations since 1948.[25]

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[20]Koops *et al*, "Introduction..., 1.

[21]Gary Anderson, "Preparing for the Worst: Military Requirements for Hazardous Missions," in *Peace Operations: Trends, Progress, and Prospects*, ed. Donald C.F. Daniel, Patricia Taft, and Sharon Wiharta (Washington, DC: Georgetown University Press, 2008), 63.

[22]United Nations, "'Brahimi Report': Report on the Panel on United Nations Peace Operations," accessed 4 March 2016, http://www.un.org/en/events/pastevents/brahimi_report.shtml. A link to the report is available at this website.

[23]Koops *et al*, "Introduction..., 7.

[24]Haq, "Challenges of 21st-Century Peace Operations…, 8.

[25]United Nations, "Peacekeeping Fact Sheet," accessed 12 February 2016, http://www.un.org/en/peacekeeping/resources/statistics/factsheet.shtml.

However, only 13 of these operations were created during the 40-year Cold War (1948-1988),[26] with the remaining 58 being created in the past 26 years (1988-2016). The collapse of the Warsaw Pact and the end of the Cold War led to a "maze of new complexities,"[27] and a new security environment emerged whereby increased numbers of conflicts, many resulting from "the release of a number of pent-up conflicts" of ethnic origin, then required far more robust peace operations in response.[28] As a result, the scale of UN deployments dramatically increased and intervention was frequently required in intra-state conflicts, all within a context that often included the presence of urgent humanitarian needs.[29] In 1993 alone, the cost of UN peace operations exceeded the cumulative costs of the previous 48 years.[30]

Since 1948, UN peace operations have evolved from specially purposed and relatively small engagements with limited goals to significantly larger and highly institutionalized undertakings for which hundreds of thousands of uniformed personnel have deployed from over 120 Member States.[31] Presently, the UN has 16 operations ongoing (Table 1), employing almost 125,000 personnel including approximately 91,000 troops, 13,500 police, 1,800 military observers, 16,800 UN civilian staff, and 1,700 volunteers.[32] This current operational strength is the highest in the UN's history and makes it second only to the United States (US) in terms of

[26]Koops *et al*, "Introduction..., 2.
[27]Henry Kissinger, *Diplomacy* (New York: Simon and Schuster, 1994), 812.
[28]Hans Hækkerup, "UN Peacekeeping and New Challenges in a New World," in *UN Peacekeeping in Trouble: Lessons Learned from the Former Yugoslavia*, ed. Wolfgang Biermann and Martin Vadset (Aldershot: Ashgate Publishing Limited, 1998), 296.
[29]Jim Whitman, "The UN Specialized Agencies, Peacekeeping and the Enactment of Values," in *Peacekeeping and the UN Agencies*, ed. Jim Whitman (Portland: Frank Cass Publishers, 1999), 126.
[30]Kathleen Newland and Deborah Waller Meyers, "Peacekeeping and Refugee Relief," in *Peacekeeping and the UN Agencies*, ed. Jim Whitman (Portland: Frank Cass Publishers, 1999), 18.
[31]Koops *et al*, "Introduction..., 2.
[32]United Nations, "Peacekeeping Fact Sheet...

troops stationed worldwide,[33] and higher than even the US in terms of deployed troops on operations.

Recent conflict trends indicate that UN peace operations will continue to be in demand: the number of civil and intra-state wars has increased from four in 2010 to 15 in 2015.[34] Furthermore, the 2015 Global Peace Index reported that the total economic impact of armed conflict over the previous year was $14.3 trillion US dollars (USD), equivalent to 13.4 percent of worldwide gross domestic product or the combined economies of Brazil, Canada, France, Germany, Spain and the United Kingdom. The report underscored an eight-year decent in average global peacefulness, driven by factors such as internally displaced persons, refugees, deaths from internal conflict, and impacts of terrorism.[35]

The numbers of operations and associated personnel have expanded over time, and in general, so have the operational tasks within each mission. In 1998, UN peace operations averaged only three mandated tasks, but this figure had climbed to nine by 2008.[36] As of 2015, the United Nations Organization Stabilization Mission in the Democratic Republic of the Congo (MONUSCO) had over 40 unique tasks within its mandate.[37] There is an ever-growing strain arising between the increasing number of non-combat functions expected during UN peace

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[33]Courtney J. Fung, "What Explains China's Deployment to UN Peacekeeping Operations?," *International Relations of the Asia Pacific* (2015): 2; Mark Malloch-Brown, *The Unfinished Global Revolution: The Pursuit of a New Global Politics* (New York: The Penguin Press, 2011), 50; Julia Zorthian and Heather Jones, "This Graphic Shows Where US Troops are Stationed around the World," *Time*, last modified 16 October 2015, http://time.com/4075458/afghanistan-drawdown-obama-troops/.

[34]H. Peter Langille, *Developing a United Nations Emergency Peace Service: Meeting Our Responsibilities to Prevent and Protect* (New York: Palgrave MacMillan, 2016), 7.

[35]Institute for Economics & Peace, *Global Peace Index 2015: Measuring Peace, Its Causes and Its Economic Value* (Sydney, New York, and Mexico City: Institute for Economics & Peace, June 2015), 2-3.

[36]Government Accountability Office, *Challenges Obtaining Needed Resources Could Limit Further Large Deployments and Should Be Addressed in U.S. Reports to Congress*, GAO-09-142 (Washington, DC: Government Accountability Office, December 18, 2008), 3.

[37]Alex J. Bellamy, "Unity of Effort in UN Peacekeeping," in *United Nations Peacekeeping Challenge: The Importance of the Integrated Approach*, ed. Anna Powles, Negar Partow, and Nick Nelson (Surrey: Ashgate Publishing Limited, 2015), 17.

operations and the capacity of forces to accomplish governance and development tasks in conflict-ridden operating environments.[38]

To achieve success, modern UN peace operations are more often called to operate within a comprehensive strategy where they are only one component of a broader group of agencies and departments that rest within the UN: notably the United Nations Development Programme (UNDP), the International Monetary Fund (IMF), and World Bank in the economic sector; the World Food Programme (WFP), the Office of the UN High Commissioner for Refugees (UNHCR), the Office for the Coordination of Humanitarian Affairs (OCHA), and the UN Children's Emergency Fund (UNICEF) in the humanitarian sector; the Office of the High Commissioner for Human Rights (OHCHR) in the human rights sector; UNDP, the UN Police, and the World Bank in the rule of law sector; and the Department of Political Affairs (DPA) in the political sector. [39] This UN group of organizations further lies within an even broader family of international organizations that also includes regional organizations, bilateral arrangements, and non-governmental organizations (NGOs). As such, UN peace operations are only a part of a broader peace effort and they may not even be the primary or leading component,[40] nor even be the first component on the ground or the last to leave.[41]

The evolution of UN peace operations has progressed through four distinct but overlapping generations:[42]

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[38]Anna Powles, Negar Partow, and Nick Nelson, "Introduction," in *United Nations Peacekeeping Challenge: The Importance of the Integrated Approach*, ed. Anna Powles, Negar Partow, and Nick Nelson (Surrey: Ashgate Publishing Limited, 2015), 1.

[39]Bellamy, "Unity of Effort…, 22.

[40]Major Thomas F. Greco, Unity of Effort in Peace Operations (Fort Leavenworth: United States Army Command and General Staff College, 1995), iii.

[4141]Kenneth Allard, *Somalia Operations: Lessons Learned* (Washington DC: National Defense University Press, 1995), 66-67.

[42]Walter A. Dorn, *Keeping Watch: Monitoring, Technology & Innovation in UN Peace Operations* (New York: United Nations University Press, 2011), 10-18. Developed by Dorn, this four-generational model was introduced to address over-generalization inherent within the two-generational model cited in most previous literature.

(1) Observer missions. This first generation of UN peace operations were charged with upholding a cease-fire or other type of peace agreement, and were characterized by their "observe and report" function enabled by mounted and dismounted patrols, observation posts, and checkpoints. Observer missions were first employed by the United Nations Truce Supervision Organization (1948-present) in the Middle East.

(2) Interposed forces. This second generation of UN peace operations aimed to prevent or bring cessation of hostilities between combatants by deploying troops between the opposing forces. In addition to the tasks of observer missions, this generation of peace operations also conducted searches, escorts, as well as presence and force demonstrations to achieve their mandate. The interposed force mission structure was first employed by the United Nations Emergency Force (UNEF; 1956-67) to achieve a peaceful resolution of the Suez Crisis.

(3) Multidimensional operations. This third generation of UN peace operations operated under a mandate to supervise or assist in the implementation of a complex peace agreement to promote sustainable peace by overseeing a much broader array of societal activities (*e.g.*, judicial, economic, human rights) than the previous generations. These missions may have included or combined such objectives as disarmament, demobilization and reintegration (DDR) of ex-belligerents, mine clearance, humanitarian assistance, and electoral supervision.

Utilizing not only military personnel, but also police and other civilian personnel, tasks included those of the previous two UN peace operations generations, plus such additional tasks as the protection of civilians, weapon destruction, escort and protection of important personnel and infrastructure. Multidimensional mission structure was first employed by the United Nations Operation in the Congo (1960-1964), but not subsequently employed until achieving wide use beginning in 1989 at the end of the Cold War.

(4) Transitional administration. In contrast with the previous generations, the purpose of this fourth generation of UN peace operations is to fully govern a region amid its transition to self-government. This generation requires comprehensive management and oversight across all elements of society (e.g., military, legal, health, economic, education, public works and services). Transitional administration missions were first employed by the United Nations Interim Administration Mission in Kosovo (UNMIK) (1999-present).

Over the last two decades in particular, peace operations have been marked by deployments of personnel to locations "where there is no peace to keep, and with peacekeepers increasingly threatened by asymmetric warfare and targeted by armed combatants."[43] In April 2013, five Indian contingent troops were killed after being deliberately targeted in Jonglei, South Sudan. Two months later, combatants associated with Al-Shabaab successfully attacked a UN

[43]Hervé Ladsous, "Forward," in *United Nations Peacekeeping Challenge: The Importance of the Integrated Approach*, ed. Anna Powles, Negar Partow, and Nick Nelson (Surrey: Ashgate Publishing Limited, 2015), xv.

compound in Mogadishu, killing numerous UN personnel.[44] In Mali, the UN currently operates in an environment where insurgents regularly mix amongst locals within northern communities and attack UN forces. These new challenges are expected to continue to confront UN PO in the future.

Even the MFO mission has experienced a rapid rise in attacks in recent years. The mission is a twelve-nation, non-UN led mission tasked with overseeing the implementation of the 1979 Egypt-Israeli Peace Treaty by operating checkpoints and observation posts along the international boundary in Sinai and through conducting occasional inspections to verify compliance with the treaty.[45] An MFO vehicle "sustained extensive damage" as a result of an improvised explosive device (IED) blast in 2011, the North Camp was breached by a violent crowd who caused destruction and injured eight personnel in 2012, a bus monitor was kidnapped and briefly held captive in 2013, and in recent years, MFO personnel frequently use roads that were planted with IED by militants.[46] In June 2015, an Islamic State (IS) jihadist rocket attack was conducted on MFO forces,[47] and two months later, an IED planted by the IS wounded six MFO troops.[48] These are only some of the incidents that have occurred in recent years and some regard a major attack as "inevitable."[49] The current MFO organization is a monitoring force (first

[44]Haq, "Challenges of 21st-Century Peace Operations…, 8-9.

[45]Eric Trager, *Securing the Sinai MFO Without a U.S. Drawdown*, Policy Watch 2478 (Washington, DC: The Washington Institute for Near East Policy, 2015); Zack Gold, "Sinai Militancy and the Threat to International Forces," *Strategic Assessment* 18, no. 2 (July 2015): 35.

[46]Gold, "Sinai Militancy and the Threat..., 38-39.

[47]Eric Trager, *Securing the Sinai MFO Without a U.S. Drawdown*, Policy Watch 2478 (Washington, DC: The Washington Institute for Near East Policy, 2015).

[48]David Schenker, *Security Challenges in Egypt Two Months After Morsi* (Washington, DC: The Washington Institute for Near East Policy, December 16, 2015), 4.

[49]Gold, "Sinai Militancy and the Threat..., 38-39.

generation type) that is not equipped as a combat force and is considered a "tempting target" for further Sinai-based militants.[50]

Inconsistent Support to UN Peace Operations from UNSC and Member States

Since the rapid increase of UN peace operations in the 1990s and again in 2003, officials and onlookers have bemoaned the lack of personnel and resources in comparison with mission requirements that UN Member States have been willing to provide.[51] As lamented by UN Secretary-General Ban Ki-moon in 2011, "Securing the required resources and troops [for UN peace operations] has consumed much of my energy. I have been begging leaders to make resources available to us."[52] Within this issue lie three important trends of inconsistent support to UN peace operations by Member States.

First, "token contributions of forty or less troops" by troop contributing countries (TCCs) have become an increasingly frequent form of UN peace operation participation, both in raw total troop contributions and as a percentage of all national contributions.[53] Such meagre offerings allow a nation to avoid being labelled as a non-contributor, and still ensure national access to operational and political information concerning the mission, as well as safeguarding a voice in future policy decisions related to the specific operation.[54] As Canada's one-person

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[50]Amanda Connolly, "Canadian Peacekeepers in Sinai Unequipped to Deal With ISIS Insurgency, Experts Warn," *iPolitics*, 3 September 2015, accessed 16 March 2016, http://ipolitics.ca/2015/09/03/canadian-peacekeepers-in-sinai-unequipped-to-deal-with-isis-insurgency-experts-warn/.

[51]Donald C.F. Daniel, "Contemporary Patterns in Peace Operations, 2000-2010," in *Providing Peacekeepers: The Politics, Challenges, and Future of United Nations Peacekeeping Contributions*, ed. Alex J. Bellamy and Paul D. Williams (Oxford: Oxford University Press, 2013), 25.

[52]Ban Ki-moon, "Human Protection and the 21st Century United Nations" (Cyril Foster Lecture, Oxford University, Oxford, UK, 2 February 2011), accessed 13 February 2016, http://www.un.org/apps/news/infocus/sgspeeches/search_full.asp?statID=1064.

[53]Katharina P. Coleman, "Token Troop Contributions to United Nations Peacekeeping Operations," in *Providing Peacekeepers: The Politics, Challenges, and Future of United Nations Peacekeeping Contributions*, ed. Alex J. Bellamy and Paul D. Williams (Oxford: Oxford University Press, 2013), 48.

[54]Coleman, "Token Troop Contributions..., 55.

contribution to the United Nations Peacekeeping Force in Cyprus (UNFICYP) expressed in late-2010:

> As long as there is a Canadian contribution, the Canadian ambassador goes to all the meetings, is privy to all the information, and has a say in what happens with the mission. Whether your contingent is a thousand or it's one, you still have a voice.[55]

Second, uniformed personnel for UN peace operations continue to be provided in a highly disproportionate manner amongst Member States, with well above two-thirds coming from approximately 20 nations.[56] Based on recent contribution trends, only about 210,000 troops worldwide are hypothesized to actually be available for deployment by the UN.[57] Moreover, a few developing nations have carried dramatically disproportionate weight from 1996 onwards, with India, Pakistan, Bangladesh, Ghana, and Nepal being among the top ten TCCs throughout this period. Jordan was also a top-ten TCC throughout this period until 2013, and in the latter portion of the period, Rwanda (2008) and Ethiopia (2011) emerged as consistent top-ten TCCs.[58] Diversification of its troop contributions away from such high dependence on only a few developing nations, and often with limited military capabilities, is a significant issue that the UN will need to overcome in the future.[59]

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[55]Coleman, "Token Troop Contributions..., 55.

[56]Alex J. Bellamy and Paul D. Williams, "Introduction: The Politics and Challenges of Providing Peacekeepers," in *Providing Peacekeepers: The Politics, Challenges, and Future of United Nations Peacekeeping Contributions*, ed. Alex J. Bellamy and Paul D. Williams (Oxford: Oxford University Press, 2013), 2.

[57]Daniel, "Contemporary Patterns..., 28.

[58]Birger Heldt, "Trends From 1948 to 2005: How to View the Relation between the United Nations and Non-UN Entities," in *Peace Operations: Trends, Progress, and Prospects*, ed. Donald C.F. Daniel, Patricia Taft, and Sharon Wiharta (Washington, DC: Georgetown University Press, 2008), 24; United Nations, "Troop Contributors," accessed 14 February 2016, http://www.un.org/en/peacekeeping/resources/statistics/contributors.shtml. Information for 1996-2005 was taken from Heldt (2008) and data for 2006-2015 was taken from the UN "Troop Contributors" website by observing December data sets for each year.

[59]Heldt, "Trends From 1948 to 2005..., 26.

Successful UN peace operations, first and foremost, require the UNSC to develop a clear and achievable operational intent and to secure the backing of the great powers – particularly the permanent members of the UNSC – to accomplish it.[60] Yet, while the leading Western developed nations continue to provide the vast majority of funding for UN peace operations, these nations – who possess many of the world's most advanced military capabilities – have been increasingly reluctant to provide their own troops to these operations.[61] Currently, China is the only permanent member of the UNSC that is a top-ten TCC, far outstripping the contributions of the others: France, 25th; United Kingdom, 52nd; United States, 73rd; Russia, 74th.[62] Furthermore, the UNSC has frequently failed to unite behind particular missions, with notable examples from the 1990s being the UN operations in Somalia, Bosnia, and Rwanda.[63]

Third, the UN frequently has difficulty securing specialized capabilities that it characterizes as enablers, such as engineering, medical, aviation, and logistical capabilities.[64] Past UN peace operations have demonstrated the critical nature of these capabilities for increasingly complex missions.[65] However, in the words of former Under-Secretary-General for Field Support, Ameerah Haq, "we simply do not have the necessary enablers when they are needed."[66] Moreover, technological advances have not been significantly employed on UN peace

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[60]Bellamy, "Unity of Effort…, 20.

[61]Bernardo Mariani, "China's Role in UN Peacekeeping Operations," in *Handbook on China and Developing Countries*, ed. Carla P. Freeman (Cheltanham, United Kingdom: Edward Elgar Publishing Limited, 2015), 253.

[62]United Nations, "Troop Contributors," accessed 14 February 2016, http://www.un.org/en/peacekeeping/resources/statistics/contributors.shtml. The data presented is current as at 31 December 2015.

[63]Koops *et al*, "Introduction..., 2.

[64]United Nations, "Uniformed Capability Requirements for UN Peacekeeping: Current Gaps, Commitments to Enable More Rapid Deployment, and other Capability Requirements," last modified 24 August 2015, https://cc.unlb.org/Uniformed%20Capability%20Requirement%20Paper/UN%20PK%20Capability%20Requirements%20Paper%20-%20Rev%2024%20Aug%202015.pdf.

[65]Patricia Taft, "Preparing for Peace: Specialized Requirements for Complex Missions," in *Peace Operations: Trends, Progress, and Prospects*, ed. Donald C.F. Daniel, Patricia Taft, and Sharon Wiharta (Washington, DC: Georgetown University Press, 2008), 71.

[66]Haq, "Challenges of 21st-Century Peace Operations…, 13.

operations, leaving much room for modernization despite the dizzying multidimensional nature of contemporary operations.[67]

In September 2014, US Vice President Joe Biden hosted a summit with numerous Member States that aimed at securing pledges for rapid reaction, engineering, aviation, medical, and intelligence forces. However, solid pledges were not achieved although follow-on regional meetings were conducted.[68] One year later, in September 2015, US president Barack Obama held the Leaders' Summit on Peacekeeping, attended by over 50 heads of state, also seeking to boost peace operations contributions. The world leaders collectively declared their recommitment to "modernizing UN peacekeeping operations to ensure their success" and "doing our part to further strengthen peacekeeping."[69] In total, approximately 40,000 troops and police personnel were pledged, as well as 40 helicopters 10 field hospitals, and numerous individual pledges to assist both in support and in capacity building efforts.[70] By far, the largest state pledge came from China, who committed (amongst other items) 8,000 troops, $1B USD over the next ten years for a UN-China "peace and development fund," and $100M USD over the next five years for the African Union towards establishing an African Standby Force.[71]

Inability to Rapidly Deploy

[67]Dorn, *Keeping Watch*..., 1; United Nations, *Report of the High-level Independent Panel*..., 92.

[68]Lamii Moivi Kromah, "Hopes High for New Capacities after Obama's Peacekeeping Summit," *IPI Global Observatory*, last modified 5 October 2015, https://theglobalobservatory.org/2015/10/peacekeeping-obama-united-nations-general-assembly/.

[69]The White House, Office of the Press Secretary, "Declaration of Leaders' Summit on Peacekeeping," last modified 28 September 2015, https://www.whitehouse.gov/the-press-office/2015/09/28/declaration-leaders-summit-peacekeeping.

[70]Paul D. Williams. "Keeping a Piece of Peacekeeping: The United States Doubles Down at the United Nations," *Foreign Affairs*, last modified 5 October 2015, https://www.foreignaffairs.com/articles/2015-10-06/keeping-piece-peacekeeping.

[71]"Xi and the Blue Helmets," *The Economist*, 3 October 2015, 45-46.

At present, UN peace operations cannot be quickly deployed. The UN estimates that "the process of planning, mounting and deploying a new operation can take, on average, from 6 to 12 months."[72] Delays to mounting a UN peace operation in the wake of an emerging crisis not only elevates risks to vulnerable populations in conflict areas, but also leads to increased size, duration, and cost requirements for the specific mission when forces are finally deployed. Furthermore, such delays are extremely corrosive to confidence, respect, and resource support for the UN.[73] More than simply not having reliable access to mission-critical specialized and enabling capabilities, the UN remains deficient when it comes to rapidly (i) creating multinational forces, (ii) deploying operationally effective field headquarters, and (iii) establishing reliable command and control structures.[74]

The formerly used UN Stand-by Arrangements System (UNSAS) proved inadequate for addressing these problems. The UNSAS was merely based on "conditional pledges," negotiated between the UN and individual Member States, to contribute certain resources that remain on "stand-by" in their home nation, within specified response times and restrictions to UN peace operations that may arise.[75] However, one of the most significant conditions was that individual nations always retain the final decision on whether to actually deploy these pledged resources. As a result, the UNSAS was reduced to merely a list that "provides the initial consultation process by giving clues" to the UN regarding what Member States *might* contribute.[76] Such an arrangement was useful in non-crisis situations, but was extremely deficient and liable to failure in crisis situations where quick reactions are absolutely vital. Recent delays to deploying full-

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[72]United Nations, *Global Field Support Strategy, Report of the Secretary-General*, United Nations Document A/64/633 (New York: United Nations General Assembly, January 16, 2010), 9.

[73]Langille, *Developing a United Nations Emergency*..., 8-9.

[74]Koops *et al*, "Introduction..., 7.

[75]United Nations, *United Nations Stand-By Arrangements System Military Handbook*, Edition 2003 (New York: United Nations, Department of Peacekeeping Operations, 2003), 4-5.

[76]United Nations, *United Nations Stand-By Arrangements*..., 4.

strength UN peace operations missions in South Sudan, Mali, and Central African Republic highlighted these ongoing challenges.[77]

In July 2015, the UN replaced UNSAS with the Peacekeeping Capability Readiness System (PCRS) under the newly established Strategic Force Generation and Capabilities Planning Cell (SFGCPC), which itself was created to establish a "more coherent and strategic engagement" with troop and police contributors.[78] Improved management of specialized capabilities, such as engineering, provided a portion of the impetus for creating the SFGCPC and PCRS.[79] The intent of the PCRS is to establish "a more predictable and active process of interaction between the UN Headquarters (UNHQ) and the Member States for ensuring readiness and timely deployment of quality peacekeeping capabilities."[80] The PCRS specifically aims to (i) increase efficiency in the management of Member States' commitments, (ii) improve anticipated readiness of forces using a "more sustained and collaborative approach" between UNHQ and the Member States, and 3) in the long run, maintain a single resource for selecting TCCs for deployment on a peace operations.[81]

During the original UN Charter negotiations, the notion of a standing force for UN enforcement operations was first considered to give meaningful weight to Articles 43-45 of the

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[77]United States, Department of State, "U.S. Envoy Pressman at U.N. Debate on Peacekeeping," accessed 14 February 2016, http://iipdigital.usembassy.gov/st/english/texttrans/2014/11/20141101310557.html?CP.rss=true#ixzz40e2nTqaJ.

[78]Hervé Ladsous (Statement to the Fourth Committee, General Assembly of the United Nations, New York, 30 October 2015), accessed 29 April 2016, http://www.un.org/en/peacekeeping/documents/HL%20statement%20to%204th%20CommitteeAS%20DELIVERED30Oct2015.pdf.

[79]Adam C. Smith and Arthur Boutellis, *Rethinking Force Generation: Filling the Capability Gaps in Peacekeeping*, Providing for Peacekeeping No. 2 (New York: International Peace Institute, January 2014), 2, 6-7, 15.

[80]United Nations, "United Nations Peacekeeping Capability Readiness System: Overview," last modified 22 October 2015, https://cc.unlb.org/PCRS%20References/PCRS%20documents/PCRS%20Overview%20Oct%202015.pdf.

[81] United Nations, "United Nations Peacekeeping Capability Readiness System: Overview," last modified 22 October 2015, https://cc.unlb.org/PCRS%20References/PCRS%20documents/PCRS%20Overview%20Oct%202015.pdf.

UN Charter, but it was never adopted.[82] In 1992, Secretary-General Boutros Boutros-Ghali attempted to revive the notion of a standing UN force in his landmark report for improving UN peace operations, *An Agenda for Peace*. He stated the need for Member States to make troops available "not only on an ad hoc basis but on a permanent basis" who through being "on call could serve, in itself, as a means of deterring breaches of the peace since a potential aggressor would know that the Council had at its disposal a means of response."[83] Over the course of the UN's existence, at least twelve separate diplomatic proposals have been made to establish a standing UN force.[84]

One such proposal, which followed the Rwandan genocide and was made in the year of the UN's 50th anniversary, 1995, was made for the establishment of a Multinational UN Stand-by Forces High Readiness Brigade (SHIRBRIG).[85] With its component troops stationed in their home nation, the SHIRBRIG would be deployable in 15 to 30 days. Military components had to be self-sufficient for a minimum of 60 days, and SHIRBRIG was deployable to a maximum of six months.[86] Based on a Canadian initiative, the SHIRBRIG would be supported by a Rapid Deployable Mission Headquarters (RDMHQ), which could be immediately activated.[87] This proposal was initially developed within national studies by Canada, Denmark, and The Netherlands, and subsequently with the 28 UN Member States that participated in the Friends of Rapid Deployment (FORD) initiative.[88] Becoming operational in 2000, SHIRBRIG's participation in UN peace operations included Ethiopia and Eretria (2000), Liberia (2003), Iraq

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[82]Douglas Roche, *The United Nations in the 21st Century* (Toronto: James Lorimer & Company, Limited, 2015), 27.

[83]Boutros Boutros-Ghali, *An Agenda for Peace*, 2nd ed (New York: United Nations, Department of Public Information, 1995), 56.

[84]Koops *et al*, "Introduction..., 7.

[85]Hækkerup, "UN Peacekeeping and New Challenges…, 302.

[86]Sheehan, *The Economics of UN Peacekeeping*..., 168.

[87]Hækkerup, "UN Peacekeeping and New Challenges…, 302.

[88]Peter Langille, *Preparing For A UN Emergency Peace Service* (New York: Friedrich Ebert Stiftung, 2012), 1.

(2003), Côte d'Ivoire (2004), and Sudan (2005).[89] However, SHIRBRIG ceased all activities in June 2008 when its 16 Member States voted to discontinue their contributions, representing what some commentators termed "another failure of Western countries to live up to their peacekeeping commitments and their responsibility to protect."[90]

The Need to Learn and Do Better

As attested by Lieutenant-General (Retired) Roméo Dallaire, former Force Commander for the United Nations Assistance Mission for Rwanda (UNAMIR), instead of outright rejection of UN PO "because of its chequered history, we need to learn from its failures as well as its successes."[91] Honest and objective assessments need to be made regarding where "UN peacekeeping *needs* to do better and where they *can* do better." Once identified, strategies can be implemented to increase effectiveness and efficiency of UN missions.[92] As stated by Hervé Ladsous, the UN's current Under-Secretary-General for Peacekeeping Operations,

> United Nations peace operations are facing a number of challenges that demand greater innovation and collaboration on the part of its Member States…This challenge speaks to the heart of peacekeeping's need to address urgent capability gaps and to strengthen peacekeeping's capacity to meet the needs of future peace operations.[93]

THE CRUCIAL IMPORTANCE OF ENGINEERING

Engineering Peace: An Understudied Subject

[89]United Nations, "SHIRBRIG: Ready to Deploy," accessed 21 March 2016, http://www.un.org/en/peacekeeping/publications/yir/2006/shirbrig.htm.

[90]Walter Dorn and Peter Langille, "Where Are Our Peacekeepers?," *Toronto Star*, 8 August 2009, accessed 21 March 2016, http://www.thestar.com/opinion/2009/08/08/where_are_our_peacekeepers.html.

[91]Dallaire, "Forward..., xvii.

[92]Haq, "Challenges of 21st-Century Peace Operations…, 12.

[93]Ladsous, "Forward…, xv.

Whether in war or operations other than war (OOTW), engineering provides a broad number of vital operational capabilities through all phases of the mission that permit friendly forces to live, to move, and to fight,[94] while denying this same ability to hostile forces. For example, operations generally cannot be conducted or succeed without adequate counter-IED (C-IED) and counter-mine expertise, road networks (including bridging), infrastructure to support aerial (fixed-wing and rotary-wing) operations, accommodations, power generation, water and wastewater treatment, geospatial information, and a host of other capabilities that only engineers can provide. Furthermore, provision of engineering capabilities is not limited to mission elements, but can provide crucial host-nation support. The broad capabilities of engineering make it just as decisive on peace operations as in other types of military operations.

Yet, despite the vast importance of engineering on peace operations, it remains an underappreciated and understudied subject in academic literature. Only two substantive works have been published on the use of engineering on peace operations. The first is the book *Engineering Peace: The Military Role in Postconflict Reconstruction* by Colonel Garland H. Williams of the US Army and published by the United States Institute of Peace in 2005. This work primarily focuses on the use of engineering in post-conflict reconstruction operations during NATO peace operations in Bosnia, Kosovo, and the preliminary years in Afghanistan. It containing detailed accounts of the engineering challenges encountered during these operations, from mines to the provision of water, as well as numerous insights for future planners of post-conflict reconstruction. However, the work's breadth is limited to three major NATO-only

[94]Department of National Defence, B-GL-361-001/FP-001, *Land Force Engineering Operations – Volume 1* (Ottawa: DND Canada, 1998), 1.

operations, comprising a period of less than eight years (1996-2004) and that each included significant US participation.

The second is work is *Engineering Peace: The Critical Role of Engineers in UN Peacekeeping* by Arthur Boutellis and Adam C. Smith and published by the International Peace Institute in 2014. The document contains abundant general and engineering-specific UN operational observations, predominantly from MINUSTAH and UNMISS, and proposes several insightful recommendations for the improvement of engineering on UN peace operations. However, this work only addresses construction roles and neglects to underline the roles and importance that combat engineering has on peace operations, even the critical role of C-IED personnel on several current missions (e.g., MINUSMA).

For both aforementioned works, the absence of a broad and historical perspective shows a lack of acknowledgement of engineering capabilities that have been important on past missions, and may still be critical for future missions. In addition, neither study readily acknowledges the military engineering role of providing geospatial information and geomatics support to operations. The present study will seek to close these and other gaps by providing a broader perspective of the numerous engineering functions on peace operations across time.

Academic articles on the uses of engineering on peace operations exist in greater numbers than lengthy works. However, the majority of these articles concern geological engineering, although some other topics are covered. See Appendix 1 for a list of the articles directly addressing engineering on peace operations that were discovered during an extensive search in preparation of this study.

Not only has engineering been underappreciated by academics, until recently it has also been underappreciated by the UN. This is partly due to how force generation has been conceived

by the UN until recently. Under imposed troop ceilings, importance was given to force generating large units such as infantry battalions. When it came to enablers, the discussion largely centered on air assets (e.g., utility and attack helicopters) and engineering was given far less attention.[95] In part, this was due to engineering being both a military and a civilian function, and the belief that gaps in military engineering personnel could, at least in some measure, be closed with non-military personnel. An additional factor was that few mission start-ups, when engineering capabilities are urgently needed for infrastructure construction and other tasks, were initiated until recently, such as MINUSMA and MINUSCA.[96] These missions were all the more urgent because of their large size and the presence of asymmetric threats in those locations. In an asymmetric environment, it is difficult to compensate for the lack of military engineers by civilians because they have no organic self-defence.

However, there are signs of a growing appreciation by the UN and world leaders. In 2014, UN Secretary-General Ban Ki-Moon requested support from the US specifically for MINUSCA,[97] following which the UN accepted the US proposal for support and requested six 150-person expeditionary camps with construction supervision personnel and one year of spare parts.[98] The need for combat engineers on UN peace operations, especially after the crisis of 2013 in South Sudan and the deployment of MINUSMA, has also been underlined. In addition, while the UN viewed the "key enabler" on previous missions to be air assets, during the Leaders' Summit on Peacekeeping in 2015, the major gaps in enablers that were brought to the fore included engineering – especially C-IED – and medical evacuation capabilities.[99] With numerous

[95]Arthur Boutellis, telephone conversation with author, 22 March 2016.
[96]Arthur Boutellis, telephone conversation with author, 22 March 2016.
[97]Paul D. Williams, *Enhancing U.S. Support for Peace Operations in Africa*, Council Special Report No. 73 (New York: Council on Foreign Relations, May 2015), 13.
[98]United Nations, UN Letter of Request/Note Verbale, DFS/LSDOD/2014/003, August 1, 2014.
[99]Arthur Boutellis, telephone conversation with author, 22 March 2016.

current missions taking causalities from insurgencies that employ the IED, the urgency of possessing these capabilities has been underscored.

Another indicator of the growing appreciation of military engineering to UN peace operations is the September 2015 release of the *United Nations Peacekeeping Missions Military Engineer Unit Manual* (UNMUM-Engineers),[100] which was amongst a number of other manuals produced to generate greater understanding of the function and awareness of the associated capabilities, tasks, equipment, and unit organization.[101] Owing to its extensive experience in provision of engineering capabilities on UN peace operations – in Cambodia, East Timor, Haiti, and South Sudan – Japan was the chair of the expert working group charged with producing the UNMUM-Engineers. Production of the manual commenced in March 2014 and included various contributions from 14 nations as well as DPKO, DFS, the UN Mine Action Service (UNMAS), and the Geneva International Centre for Humanitarian Demining (GICHD).[102]

The recent heightened attention paid to the increasing importance of engineering on UN peace operations underscores the need for a broader and more historical survey of the uses of this function, but which has not yet been produced within the academic community.

General Characteristics of Engineers

In all types of military operations, engineers are usually a scarce resource that must be constantly employed and rarely held in reserve. "Engineers are always in demand and there will

[100]United Nations, *United Nations Peacekeeping Mission Military Engineer Unit Manual* (New York: Department of Peacekeeping Operations and Department of Field Support, September 2015).

[101]Japan. Ministry of Defense. "United Nations Military Manual for Engineers (UNMUM-Engineers)," accessed 19 April 2016, http://www.mod.go.jp/e/d_act/kokusai_heiwa/engn_manual/.

[102]Japan, Ministry of Defense, "United Nations Military Manual for Engineers (UNMUM-Engineers)," accessed 19 April 2016, http://www.mod.go.jp/e/d_act/kokusai_heiwa/engn_manual/. The participating nations, which provided various levels of contributions to producing the manual included Bangladesh, Brazil, China, Ghana, Indonesia, Japan, Norway, Peru, the Philippines, Singapore, South Africa, Sweden, the UK, and the US.

never be enough of them, neither soon enough or with sufficient resources."[103] Engineering encompasses a wide range of subject areas and specializations, for execution across all operational environments from combat to rear area support, and encompasses the disciplines of civil, electrical, mechanical,[104] and geological engineering and concerns numerous sub-disciplines such as structural, environmental, water resources, transportation, railway, and mining engineering. Military engineering, "the art and practice of designing and building military works and of building and maintaining lines of military transport and communications," is recognized to be the oldest form of engineering and was the direct forerunner of civil engineering.[105] It was not until the late-18th century that civil engineering emerged as a discipline separate from military engineering.[106]

Requirements and requests of engineers almost always exceed their capacity, and the selection of some tasks for completion inevitably means that other requests will not be completed. The inevitable absence of adequate time, personnel, equipment, or material resources for engineering tasks means that engineers must possess ingenuity, flexibility, and versatility. Peace operations rely on a combination of engineering personnel, including military, civilian, commercial, and the UN Office for Project Services (UNOPS). Each type has its operational strengths and shortcomings.[107]

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[103]Colonel David Harries (Retired), telephone conversation with author, 20 February 2016.

[104]Department of National Defence, B-GL-361-001/FP-001, *Land Force Engineering Operations – Volume 1* (Ottawa: DND Canada, 1998), 1.

[105]Encyclopædia Britannica, "Military Engineering," accessed 5 May 2016, http://www.britannica.com/technology/military-engineering. The earliest remains of military engineering activities are "hill forts constructed in Europe during the late Iron Age."

[106]G. West and E.P.F. Rose, "Discussion of 'The First Engineer Geological Publication in the UK? ' by M.G. Culshaw, *Quarterly Journal of Engineering Geology and Hydrogeology*, 37, 227-231," *Quarterly Journal of Engineering Geology and Hydrogeology* 38, no. 2 (May 2005): 216.

[107]Arthur Boutellis and Adam C. Smith, *Engineering Peace: The Critical Role of Engineers in UN* Peacekeeping (New York: International Peace Institute, January 2014), 1.

Engineering factors and personnel employment are essential considerations during all phases of a commander's plan throughout all phases of a UN peace operation. Engineering component representation must therefore be included during all operational planning activities to provide necessary advice regarding the capabilities and judicious employment of engineering resources.[108] In order to complete this function, engineers are often required to educate non-engineers on engineer roles, capabilities, priorities, limitations, as well as opportunities to enhance engineering contributions.[109] Comprehensive prioritization and coordination of engineering assets by centralized authorities are required to ensure that engineers are used in the most effective and efficient manner.[110] Strong collaboration between engineers from developed and developing nations, as well as between all mission engineers and NGOs, can reap significant benefits for all parties. See Box 1 for related insights from a former Force Engineer on UNPROFOR.

Box 1 – Engineering Collaboration between Developed Nations, Developing Nations, and NGOs: Insights from a Former Force Engineer

(see Appendix 2 for the unabridged notes between David Harries and the author)

Each nation that provides engineers has different skills and technological competencies and there is often little common ground between them. Some nations can have rough methods and yet perform well. How hard nations try and which methods are used to accomplish their mission is sometimes questionable. What they consider more or less legal also depends on their national culture. On UN peace operations, less developed nations are given the opportunity to

[108]Department of National Defence, B-GL-361-001/FP-001..., 47.

[109]Colonel David Harries (Retired), telephone conversation with author, 20 February 2016. He refers to this vital role as "political engineering."

[110]This is a general acknowledged principle of tasking engineers. Regarding UN peace operations specifically, this principle is inferred by the separate centralized tasking authorities of combat and construction engineers as detailed in: United Nations, *United Nations Peacekeeping Mission Military*..., 9.

reap knowledge and experience from more developed nations. This comes as a great benefit to them as the mission serves as a "school of the world." Several hundreds of UNPROFOR soldiers from less developed nations gained technical, civil, and military engineering knowledge from nations such as Canada – knowledge they did not possess upon arrival but took back to their nations when they were replaced. This knowledge, even in matters as elementary as ground preparation, clearing operations, and accommodation maintenance would potentially be put to good use once returned to their respective home nations.

Colonel Harries expressed concerns that peace operations have evolved to where the vast majority of TCCs are less developed nations who do not possess many modern engineering tools, let alone the most advanced technologies to best accomplish the missions. However, he emphasizes that having these less developed nations on UN peace operations is not all negative. Troops from these nations learn much about operations while participating.[111] However, the question is whether the future of UN peace operations can be guided and managed in a way that all development levels can benefit. Is the UN up to this challenge?

During his deployment UNPROFOR, Colonel Harries had to collaborate with NGOs. During the mission, the Finnish construction battalion had access to a large hall near its Zagreb airport base. Once a month, he invited representation from military, civilian, and NGOs and other organizations with engineers or significant engineering interests throughout the former Yugoslavia to attend a "tactical luncheon." Attendance would always be dependent on ease of travel at the time. Sometimes the number of attendees reached over 100. Everyone was provided with a few minutes to share the nature, circumstances, challenges, and lessons learned from their engineering work, and to ask questions. One of the most important aspects of this controlled

[111]In addition, sometimes less developed nations are better able to build for the local communities where less sophisticated technology can be better maintained locally in the future. (A. Walter Dorn, notes provided to author, 30 April 2016).

coordination forum was that it allowed for open and honest dissemination of information about failures that had occurred, and it allowed others to avoid or prevent similar failures. The forum deliberately encouraged attendees to be very forthright about the good and the bad of their operations. The forum was of such utility that many would spend significant time and money to attend; Macedonians would fly to Zagreb through Italy. It was important because lives and progress were at stake.

Due to the nature of their tasks, engineers are heavily reliant on equipment and technical skills. Military engineers therefore often require higher training investments than the average soldier. Furthermore, military engineers are expected to provide their own protection while completing their tasks, which includes having sufficient small arms (e.g., assault rifles, light machine guns, pistols, etc.), crew-served weapons (e.g., medium or heavy machine guns, grenade launchers) as well as vehicles that provide sufficient force protection.[112] In practice, however, force protection for engineers is often provided or augmented by infantry units.[113]

Types of Engineering Personnel

Military engineering tasks are broken down by the UN into two broad areas that encompass numerous engineering disciplines: combat engineering and construction engineering. Combat engineering is provided only by military engineers, whereas most construction – and other engineering tasks associated with the engineering disciplines – can be provided by either, or a combination of, military, civilian (i.e., UN civilian employees), commercial (i.e., contractors), or UNOPS personnel. However, particularly when commencing peace operations in hostile areas, military construction engineering components are initially predominant over their

[112]United Nations, *United Nations Peacekeeping Mission Military*..., 14,17.

[113]Arthur Boutellis and Adam C. Smith, *Engineering Peace: The Critical Role of Engineers in UN Peacekeeping* (New York: International Peace Institute, January 2014), 6-7.

non-military counterparts, with the non-military components increasing in proportion as the mission is established and stability improves. Civilian engineering employees can include international staff, national staff, and volunteers.[114] UNOPS is mandated by the United Nations General Assembly "as a central resource for the United Nations system in procurement and contracts management as well as in civil works and physical infrastructure development, including the related capacity development activities,"[115] and states that its mission is "to serve people in need by expanding the ability of the United Nations, governments and other partners to manage projects, infrastructure and procurement in a sustainable and efficient manner."[116] Nevertheless, the military portion of the mission is not the only component that takes casualties. Particularly in significantly unstable regions, no segment of the personnel employed by the mission is immune from potentially hostile actions. For example, in April 2013, despite being escorted by UNMISS troops, five civilian contractors were killed in an ambush while returning from a well-drilling project in the conflict-ridden Jonglei State.[117]

Combat Engineering

Combat engineering is conducted in direct support to military operations, and as stated within the UNMUM-Engineers, is primary focused on providing mobility and survivability support.[118] Mobility support tasks are intended to maintain freedom of manoeuvre to ensure operational tempo is sustained and that friendly forces do not become vulnerable to hostile

[114]Boutellis and Smith, *Engineering Peace*..., 5.
[115]United Nations, *United Nations General Assembly Resolution 65/176*, United Nations Document A/RES/65/176 (New York: United Nations General Assembly, March 28, 2011), 1.
[116]United Nations, United Nations Office for Project Services, "Misson, Vision and Values," accessed 19 April 2016, https://www.unops.org/english/About/mission-and-vision/Pages/landing.aspx.
[117]Boutellis and Smith, *Engineering Peace*..., 7.
[118]United Nations, *United Nations Peacekeeping Mission Military*..., 8.

actions.[119] Examples of typical mobility tasks include route reconnaissance and improvements, expedient repairs to road, airfield, and landing area zones, mine(field) detection and associated marking/breaching/elimination/lane proving actions, C-IED tasks, explosive ordnance disposal (EOD) and IED disposal, obstacle detection/reduction/clearing/bypass options, and gap crossing (e.g., bridging, river fording preparations).[120] Survivability tasks include force protection obstacles, earthworks, and shelters.[121] Combat engineers also possess expertise in explosives and demolitions, which have numerous applications in performing their tasks. Although not acknowledged within the UNMUM-Engineers, combat engineers, sometimes referred to as field engineers, are also trained to conduct counter-mobility tasks such as emplacing barriers and obstacles that delay, disrupt, or divert the movement of hostile forces.[122] Combat engineering units are classified by the UN as a combat support unit.[123]

The importance of combat engineers is especially amplified in areas that are ridden with mines or for which the IED is used extensively by hostile forces, as explosive hazards are a source of considerable psychological stress and fear to all personnel on the mission.[124] Reducing mine hazards can be exacerbated by poor reporting procedures by forces emplacing them. For example, during the Bosnian war, approximately 500,000 mines were placed in more than 17,000 minefields, predominantly along the zone between the opposing forces – which

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[119]Department of National Defence, B-GL-361-001/FP-001, *Land Force Engineer Operations – Volume 1* (Ottawa: DND Canada, 1998), 5.

[120]Department of National Defence, B-GL-361-001/FP-001..., 4-7; United Nations, *United Nations Peacekeeping Mission Military*..., 14.

[121]United Nations, *United Nations Peacekeeping Mission Military*..., 14.

[122]Joint Chiefs of Staff, Joint Publication 3-34…, II-1.

[123]United Nations, *Authority, Command and Control in United Nations Peacekeeping Operations* (New York: Department of Peacekeeping Operations and Department of Field Support, February 2008), 16.

[124]Simon Wessely, Samantha Thomas, Christopher Dandeker, Neil Greenberg, and Vikki Kelly, "Serving in Bosnia Made Me Appreciate Living in Bristol: Stressful Experiences, Attitudes, and Psychological Needs of Members of the United Kingdom Armed Forces," *Military Medicine* 171, no. 5 (May 2006): 376; Kyösti Lehtomäki, Rauno J. Pääkkönen, and Jorma Rantanen, "Risk Analysis of Finnish Peacekeeping in Kosovo," *Risk Analysis* 25, no. 2 (April 2005): 392-394.

frequently moved during the four-year conflict.[125] Mine locations were often recorded on the sides of structures which were subsequently forgotten or damaged, sometimes using extremely unreliable ground references, such as "the strawberry bush." Opposing forces would sometimes steal mines from their opponent's minefield and placing them in their own.[126]

Lieutenant-General Emmanuel Erskine, former Commander of the Army of Ghana and the first commander of UNIFIL (1978-1981), observed that significant mine and other munitions hazards were most dangerous to incoming troops that were new to the area of operations and had not yet gained an appreciation of the severity of danger. Often during his tenure in Lebanon, even local inhabitants – and frequently children – were victims of these hazards.[127] These observations remain true to the present, and therefore an important function of combat engineers is to provide explosive hazard awareness training not only to friendly forces, but also to local populations. Female combat engineers can play a particularly important role in providing this training to local women and children (see Box 2.1). In her study of the UN Mission in Ethiopia and Eretria, Elise Barth of the Peace Research Institute of Oslo reported that female soldiers from both Ghana and Kenya were able to better interact with local women than males and even European women.[128]

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[125]Colonel Garland H. Williams, *Engineering Peace: The Military Role in Postconflict Reconstruction* (Washington, DC: United States Institute of Peace, 2005), 83.

[126]Ibid.

[127]Lieutenant-Colonel Emmanuel A. Erskine, *Mission with UNIFIL: An African Soldier's Reflections* (London, Hurst & Company Limited, 1989), 42-43.

[128]Elise Barth, "The United Nations Mission in Eritria/Ethiopia: Gender(ed) Effects," in *Gender Aspects of Conflict Intervention: Intended and Unintended Consequences* (Oslo: International Peace Research Institute, 2004), 17-20.

Box 2 – Female Engineers for Mine Clearance

(see Appendix 3 for the unabridged version)

During the Soviet occupation of Afghanistan, an estimated six million Afghans fled their homes for Pakistan, and another three million fled into Iran. The displaced Afghan in Pakistan were mainly gathered around Peshawar in the north and Quetta in the central-west, and languished in large tented refugee camps until it was safe to return to their homes.[129] Following the Soviet withdrawal, the UN initiated a humanitarian and economic assistance mission in 1988, Operation Salam, to assist in the return of the Afghans refugees and the rehabilitation of their nation.[130] Mines, predominantly laid by the Soviets (but also by the Mujahedeen) – mostly anti-personnel – had reduced the Afghan land available for cultivation by approximately 40 percent.[131] By the end of Operation Decimal, approximately 20,000 Afghans had been trained by the nations providing mine training,[132] for which Canada had provided an important contribution.

The UN and Afghan government specifically requested female engineering officers from Canada as it was the only nation capable of providing female trainers.[133] Three female officers were provided by Canada during each rotation of Operation Decimal.[134] Captain Sylvie Lemieux (later retiring as a Lieutenant-Colonel) was among the Canadian female engineering officers deployed on the final rotation, and was the Second-in-Command of the Canadian contingent. Like the previous three rotations, and while the Canadian male engineering officers and non-commissioned personnel worked with Pakistan Army engineers to teach Afghan men to dispose

[129]Ian Mansfield, *Stepping into a Minefield: A Life Dedicated to Landmine Clearance Around the World* (Newport: Big Sky Publishing, 2016), Chapter 2.

[130]Prince Sadruddin Aga Khan, "'Operation Salam': To Build a Future," *UN Chronicle* 27, no. 2 (June 1990): 22.

[131]Canada, Department of National Defence, "Details/Information for Canadian Forces (CF) Operation Decimal," accessed 21 January 2016, http://www.cmp-cpm.forces.gc.ca/dhh-dhp/od-bdo/asia/DECIMAL-eng.asp.

[132]Khan, "'Operation Salam'…, 22.

[133]Lieutenant-Colonel Sylvie Lemieux (Retired), telephone conversation with author, 19 January 2016.

[134]Department of National Defence, "Details/Information for Canadian Forces (CF) Operation Decimal," accessed 21 January 2016, http://www.cmp-cpm.forces.gc.ca/dhh-dhp/od-bdo/asia/DECIMAL-eng.asp.

of mines using explosives, the task of two of the Canadian female engineering officers was to provide mine awareness training to women and children in the refugee camps, schools, clinics, while the third Canadian female engineering officer worked within the mission headquarters.[135]

Within the Afghan patriarchal society, it was unacceptable for foreign men to train the women; rather, they were responsible for caring for the children.[136] The training to Afghan women and children was important as they had principal responsibility for gathering wood, clearing fields, and were therefore often the first to encounter mines in these locations, and they were therefore highly vulnerable. Furthermore, a woman handicapped by a mine blast or any other devastating event had a low chance of survival as the family would typically not care for them.[137] The women and children were taught to recognize likely areas for mines, and when mines were discovered, they were trained to mark the location and report it.[138] During Captain Lemieux's rotation, a "Master Teacher" program was initiated whereby educated Afghan women were taught to be teachers in Pakistan and later in Afghanistan. This program existed in Peshawar and Quetta, and trained scores of Master Teachers.[139]

[135]Department of National Defence, "Details/Information for Canadian Forces (CF) Operation Decimal," accessed 21 January 2016, http://www.cmp-cpm.forces.gc.ca/dhh-dhp/od-bdo/asia/DECIMAL-eng.asp.
[136]Lieutenant-Colonel Sylvie Lemieux (Retired), telephone conversation with author, 19 January 2016.
[137]Ibid.
[138]Ibid.
[139]Ibid.

Vehicles used by combat engineers should have the same force protection capability as the other mission elements they are directly supporting, and should be sufficient for all foreseeable mission tasks. Nations ideally provide engineers with armoured personnel carriers (APCs) for carrying out combat engineering tasks. Some nations, particularly developed nations, possess engineering variants of APCs that include connections for welding and other tools, augers, dozer blades, and additional engineering capabilities.[140] Specialized engineering vehicles based on the platform of a main battle tank but not possessing the main armament (i.e., the tank gun), sometimes generically referred to as armoured engineering vehicles, have amongst the highest force protection capabilities available to engineers. Armoured engineering vehicles can include such capabilities as excavator arms, dozer blades, expediently launched bridging, augers, winches, mine rollers and mine ploughs, and cranes, and are needed under extremely hostile conditions when civilian counterpart capabilities (e.g., dozers, excavators, etc.) are too vulnerable to hostile fire.[141] Armoured engineering vehicles are also very useful under non-combat conditions, such as executing building demolition and debris movement (Photo XXX) or earth-movement to channel flood waters.[142] Armoured engineering vehicles are often amongst the combat engineering capabilities of many developed nations, such as Canada, France, Germany, Russia, the United Kingdom (UK), and the US.

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[142]Department of National Defence, "New Armoured Engineering Vehicles for the Army," *The Maple Leaf* 16, no. 4 (April 2013): 9.

Photo XXX[143]: In May 1992, Canadian military engineers deployed on UNPROFOR use a Badger armoured engineer vehicle to demolish a damaged building Vukovar, Croatia, which is beyond repair.

Construction Engineering

Construction engineering is primarily focused on mission sustainment and concerns infrastructure projects services. Construction engineering can be further classified as horizontal or vertical construction, and are often conducted with future improvements in mind. Horizontal engineering relies heavily on heavy equipment expertise and involves the development, maintenance, and repair to paved and unpaved road, bridging, runway/helipad, and boat ramp infrastructure. Inadequate horizontal engineering support can present grave challenges for a UN peace operation. The extremely heavy weight of military vehicles, particularly those that are armoured, can be a significant burden on already deficient road networks. Keeping routes open

[143]Canada, Department of National Defence, *CFJIC ISC92-4007-10*, taken May 1992, obtained from the Army Learning Support Centre, Tactics School, Canadian Armed Forces, 29 April 2016. Caption information obtained from: Charmion Chaplin-Thomas, Vic Johnson, and Bill Rawling, *Ubique!, Canadian Military Engineers: A Century of Service* (Burnstown: General Store Publishing House, 2003), 40.

for operations, logistical transport, humanitarian support, and other tasks is critical to mission success. Military vehicles that use attempt to use inadequate surfaced and un-surfaced road infrastructure transfer loads greater than the effective strength of the road, with the result that road degradation accelerates, road life is further shortened, and possible increases to vehicle fatalities. Inadequate roadside drainage can further accelerate this process. Horizontal engineering also includes earthworks, drainage, and site preparations tasks,[144] and in some developed nations, military engineers possess expertise in the development and maintenance of rail and port infrastructure. As the US found during the United Nations Operation in Somalia II (UNOSOM II), the presence of poor roads, as well as inadequate construction engineers and intra-theatre airlift left them unable to maintain main supply routes and put tremendous stress on the force's ability to achieve their mandate.[145]

Vertical construction typically encompasses conversion of existing infrastructure and new construction of rigid and semi-rigid (as well as pre-fabricated structures), including all associated electrical, heating, ventilation, air conditioning and other work for accommodations, kitchens, medical, administrative, logistical, recreational, perimeter defences, and other mission facility requirements. These tasks may all be required in locations that are inaccessible by road, lack easy access to construction materials, with inadequate or no existing networks for power and potable water distribution, and with significant hazards from mines and other munitions. Conversion of existing facilities may require substantial modifications to meet the basic requirements of the incoming military force.

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[144]United Nations, *United Nations Peacekeeping Mission Military*..., 19.

[145]United States Army, *United States Forces Somalia. After Action Report and Historical Overview: The United States Army in Somalia, 1992-1994* (Washington, DC: Centre of Military History, United States Army, 2003), 30, 65.

Vertical construction also includes well drilling, water purification and treatment, and surveying capabilities.[146] Military operations require secure sources of water, which are often provided from groundwater.[147] In Kosovo, based on lessons from Bosnia, groundwater availability was identified by the US as a critical selection criterion in the evaluation of potential camp locations.[148] Hydrogeological expertise from engineers not only assists in the provision of water, but can inform operational planning with regard to the effects of near-surface water on off-road mobility of personnel and vehicles, excavation, waste disposal and environmental remediation concerns, and the detection of explosive ordnance threats.[149] Furthermore, groundwater does not respect political boundaries and can potentially be a source of conflict due to real or perceived inequality of resource use.

Adequate water supply is one of the most crucial logistical concerns in an arid or desert environment. These conditions also present challenges for construction efforts resulting from possible combinations of meagre water resources, extreme temperatures, dust, inadequate or lack of construction materials, and soil conditions.[150] Hydrogeological expertise is instrumental in developing subsurface water sources, especially if hydrogeology of the operational region is not already well understood. Application of terrain evaluation and modern technology provided geologic advice that contributed to the success of the UNPROFOR (1992-1995) in the former Yugoslavia, as well as NATO's Implementation Force (1995-1996) and Stabilisation Force

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[146]United Nations, *United Nations Peacekeeping Mission Military*..., 18.

[147]John D. Mather and Edward P.F. Rose, "Military Aspects of Hydrogeology: An Introduction and Overview," in *Military Aspects of Hydrogeology*, ed. E.P.F. Rose and J. D. Mather (London: The Geological Society, 2012), 3.

[148]Christopher A. Gellasch, "Hydrogeological Support to United States Military Operations, 1917-2010," in *Military Aspects of Hydrogeology*, ed. E.P.F. Rose and J. D. Mather (London: The Geological Society, 2012), 234.

[149]Mather and Rose, "Military Aspects of Hydrogeology..., 3.

[150]Robert B. Knowles and William K. Wedge, "Military Geology and the Gulf War," in *Military Geology in War and Peace*, Reviews in Engineering Geology, Volume XIII, ed. James R. Underwood, Jr., and Peter L. Guth (Boulder: The Geological Society of America, 1998), 122.

(1996-2005) missions that succeed UNPROFOR.[151] For example, during UNPROFOR in 1993, a time at which the worst hostilities of the conflict occurred, hydrogeological assessments were conducted by Royal Engineers augmented with civilian expertise at five UN camp locations as water at these locations was "insecure or of dubious quality."[152] The only existing hydrogeological maps of the area dated from the Second World War and their reliability was questioned due to suspicion that the maps produced by Yugoslavian geologists were incorrectly marked to deliberately mislead occupying German forces. Fieldwork was significantly limited by the hostilities. The assessments succeeded in identifying subsurface water sources within the perimeter fencing at each of the UN camp locations. The wells were dug by 521 Specialist Team Royal Engineers (Water Development), although one well had to be moved after testing reveled the groundwater at its location had been "severely polluted" diesel fuel spilled while filling generators providing power to the camp. The civilian specialist also provided advice on slope stability on a main supply route (MSR) near one camp, and suitable borrow pits locations for MSR maintenance near another camp. [153]

Geospatial Engineering

Geospatial engineers also provide vital role on UN peace operations, with both military[154] and civilian personnel contributing to this function. The UN Geospatial Information Section (formerly the Cartographic Section) in the Department of Field Support provides direct support

[151]Nathanail, "Terrain Evaluation for Peacekeeping..., 7, 12.

[152]C. Paul Nathanail, "Hydrogeological Assessments of United Nations Bases in Bosnia Hercegovina," in *Military Geology in War and Peace*, Reviews in Engineering Geology, Volume XIII, ed. James R. Underwood, Jr., and Peter L. Guth (Boulder: The Geological Society of America, 1998), 211.

[153]Nathanail, "Hydrogeological Assessments of United Nations Bases..., 212-215.

[154]United Nations, *The United Nations Stabilization Mission in Haiti (MINUSTAH), The Statement of Unit Requirement for Brazil Engineer Company* (New York: Department of Peacekeeping Affairs, 30 June 2015), 5. For example, the Brazilian company deployed on MINUSTAH contains topographical capabilities in its headquarters section. Additional geospatial capabilities are likely to be in the mission headquarters.

to peace operations, as well as the UNSC and the Secretariat.[155] Geospatial information of natural and man-made features of the area of operations is important for UN forces to effectively manoeuvre, site camps and positions of observation, determine ideal locations for offensive and defensive actions, avoiding impacts to culturally sensitive sites and the environment, and even locating groundwater sources. The use of geographic information systems (GIS), remote sensing including satellite imagery and aerial photographs, existing maps and reports, and field reconnaissance greatly assist these efforts, and ultimately, the success of operations.[156] With robust analysis, determinations can be made regarding whether terrain and/or routes can support wheeled and tracked vehicles, if the terrain slopes are smooth, steep, unstable, or stepped, locations of permanent or seasonal water flows and drainage patterns, potential areas for cover and concealment or defilade and ambush, and if areas can support fixed-wing or rotary-wing aircraft infrastructure.[157] Opposing forces that are native to the area of operations will naturally have superior knowledge of the terrain and have a significant, and deadly, advantage over UN forces unless the geospatial information gap is reduced.

Geospatial engineering plays a pivotal role in effectively managing host nation assistance and capacity building, stabilization, humanitarian assistance, and development tasks during a peace operation. For example, geospatial products can be used to increase situational awareness for resource management, such as the management of groundwater,[158] and it can be used to assist

[155]United Nations Cartographic Section, Department of Field Support, "Geospatial Information for UN Operations," Presentation, United Nations Regional Cartographic Conference for Asia and the Pacific, Bangkok, Thailand, 2009, http://unstats.un.org/unsd/geoinfo/RCC/docs/rccap18/IP%20pres/18th_UNRCCAP_IP20_pres.pdf.

[156]Knowles and Wedge, "Military Geology and the Gulf War..., 117, 122; Nathanail, "Terrain Evaluation for Peacekeeping..., 7.

[157]Jack N. Rinker, "Remote Sensing, Terrain Analysis, and Military Operations," in *Military Geology in War and Peace*, Reviews in Engineering Geology, Volume XIII, ed. James R. Underwood, Jr., and Peter L. Guth (Boulder: The Geological Society of America, 1998), 145.

[158]United Nations Cartographic Section, Department of Field Support, "Geospatial Information for UN Operations," Presentation, United Nations Regional Cartographic Conference for Asia and the Pacific, Bangkok, Thailand, 2009.

in complex social, economic, and environmental issues such as those concerning poverty and food security.[159] The establishment of an accurate and tailored geospatial data infrastructure was acknowledged as a critical requirement to coordinate the UN's nation-building peace operation mandate in East Timor in a sustainable manner.[160] The geospatial record can also play an immensely important role in avoiding disputes between nations along their borders.[161]

Environmental Engineering

Military activities during peace operations can lead to numerous environmental issues across terrestrial, aquatic, and air habitats especially sensitive habitats such as wetlands, disruption to wildlife behaviour patterns due to military presence and noise, contamination from fuels and other chemicals used by military forces, erosion and/or compaction on land or water course beds from vehicular movement, and air quality degradation. In the modern operational environment, commanders are not only responsible for tactical direction of troops, but also a host of other responsibilities including ensuring environmental stewardship during mission activities.[162] Gaps often exist between tactical and environmental interests, and environmental specialists are required to assist the commander in mitigating the frequency of those gaps, or mitigating environmental effects when such gaps cannot be closed. Effective environmental stewardship is a high-priority requirement, successes or failures in which can become highly visible to the public.

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[159]Felicia O. Akinyemi, "Spatial Data Needs for Poverty Management," in *Research and Theory in Advancing Spatial Data Infrastructure Concepts*, ed. Harlan Onsrud (Redlands: ESRI Press, 2007), 261.

[160]Tracey P. Lauriault and D.R. Fraser, "Geospatial Data Infrastructure for Sustainable Development of East Timor in *Research and Theory in Advancing Spatial Data Infrastructure Concepts*, ed. Harlan Onsrud (Redlands: ESRI Press, 2007), 175-178.

[161]Dennis Rushworth, "Mapping in Support of Frontier Arbitration: Maps as Evidence," *Boundary and Security Bulletin* 5 (1998): 51.

[162]Allen W. Hatheway, "Introduction," in *The Environmental Legacy of Military Operations*, Reviews in Engineering Geology, Volume XIV (Boulder: The Geological Society of America, 2001), 4.

Greater collaboration and innovation on the part of Member States is urgently needed to minimize the environmental impacts of peace operations.[163] Such needs call for increased use of "sustainable engineering," a term described below by the United Nations Educational, Scientific and Cultural Organization (UNESCO) and employed by other organizations, but used in this study for the first time in relation to peace operations:

> Sustainable engineering is the process of using resources in a way that does not compromise the environment or deplete the materials for future generations. Sustainable engineering requires an interdisciplinary approach in all aspects of engineering and it should not be designated as a sole responsibility of environmental engineering. All engineering fields should incorporate sustainability into their practice in order to improve the quality of life for all.[164]

The 2015 HIPPO Report broadly underlined the UN's pressing requirement to embrace and enhance the use of modern technologies on peace operations to "bridge the considerable gap between what is readily available...and what is actually in the field today." [165] In 2008, the UN Environmental Management Group calculated the environmental footprint of peace operations alone to be 1.75 million tonnes of CO_2, about 56 percent of the UN's total footprint and roughly equal to the footprint of London, England.[166] The need for modern engineering technologies for combat and construction engineering technologies was discussed in Box 1, and one of the specific areas for the latter that was highlighted by the HIPPO report was "shelter and camp management."[167] The 2014 Final Report of the Expert Panel on Technology and Innovation in UN Peacekeeping also highlighted the need for more innovative methods and technologies for

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[163]Haq, "Challenges of 21st-Century Peace Operations…, 12.

[164]United Nations Educational, Scientific and Cultural Organization, "Sustainable Engineering," accessed 15 April 2016, http://www.unesco.org/new/en/natural-sciences/science-technology/engineering/sustainable-engineering/.

[165]United Nations, *Report of the High-level Independent Panel...*, 92.

[166]United Nations Environmental Programme, *Greening the Blue Helmets: Environment, Natural Resources and UN Peacekeeping Operations* (Nairobi: UNEP, 2012), 8.

[167]United Nations, *Report of the High-level Independent Panel...*, 93.

improving efficiencies in water and energy production and consumption in camps.[168] Progress has been made in this regard for some peace operations. For example, 15 percent of UNIFIL's energy is produced using solar power, and waste water treatment and recycling technologies have been introduced in nine missions, resulting "significantly reduced water exploitation."[169] However, much more progress is required. For example, sustainable engineering technologies to reduce camp fuel burdens - which can represent 50 percent of supplies needed to sustain a deployed camp[170] - not only reduce environmental impacts and financial costs, but lower logistical burdens associated with fuel transportation over long distances to often remote camps that for some missions must travel along routes targeted by hostile groups.[171] It is developed nations who possess the greatest financial and technological means, as well as the greatest potential for collaboration with academia and private business, for improving the use of sustainable engineering technology in peace operations.

Organization of Engineers on UN Peace Operations

Similar to UN Member States, the concept for the employment of a UN military engineer unit (MEU) is to group specializations into combat engineers and construction engineers.[172] The structure of a MEU is not generic; it is always tailored to meet mission-specific requirements. An

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[168]Jane Holl Lute, Ib Johannes Bager, A. Walter Dorn, Michael Fryer, Abhijit Guha, and Stacy McDougall, *Performance Peacekeeping: Final Report of the Expert Panel on Technology and Innovation in UN Peacekeeping* (New York: Department of Peacekeeping Operations and Department of Field Support, December 22, 2014), 30-34, 38-41.

[169]Haq, "Challenges of 21st-Century Peace Operations…, 12. The reference did not indicate which nine missions had the technology implemented.

[170]Army-Technology.com, "Casualty Costs of Fuel and Water Resupply Convoys in Afghanistan and Iraq," last modified 26 February 2010, http://www.army-technology.com/features/feature77200.

[171]For a broader discussion on the links between technology, innovation, and reducing the UN's environmental footprint, see: United Nations, Security Council Working Group on Peacekeeping Operations, "Technology and Innovation in UN Peacekeeping, Concept Note – Draft," last modified 15 April 2015, obtained from A. Walter Dorn on April 28, 2016.

[172]United Nations, *United Nations Peacekeeping Mission Military Engineer Unit Manual* (New York: Department of Peacekeeping Operations and Department of Field Support, September 2015), 8.

MEU may solely contain either combat or construction engineers, or a combination (composite) of both types. As such, the three general types of MEUs employed on UN peace operations are Combat Engineer Units, Construction Engineer Units, and Composite Engineer Units.[173] Furthermore, and similar to other mission force components, the composition and roles of a MEU may (i) evolve throughout the mission's lifecycle as mission priorities and challenges unfold[174] and/or (ii) be limited by which technical expertise and equipment that UN Member States are willing to contribute to the mission.

Engineering tasking authority for combat engineers and construction engineers reflects the broad characteristics of their duties. The Force Commander/Head of Military Component (HOMC) is granted operational control over all military personnel on the mission, including all military engineers.[175] However, while combat engineers remain directly within the military tasking structure, tasking authority for construction engineers is delegated from the Force Commander/HOMC to the Director of Mission Support/Chief of Mission Support (DMC/CMS), a civilian who leads the logistical and administrative support to the mission. On a day-to-day basis, and on behalf of the DMS/CMS, the Chief of Integrated Support Service (ISS) exercises tasking authority over all civilian, uniformed, and commercial support resources and is responsible and accountable to meet all operational support needs of military and civilian personnel on the mission in an effective and efficient manner.[176]

Distinguishing Between Combat and Construction Engineering

[173]United Nations, *United Nations Peacekeeping Mission Military*..., 8-9.

[174] United Nations, *United Nations Peacekeeping Operations*..., 76.

[175]United Nations, *Authority, Command and Control in United Nations Peacekeeping Operations* (New York: Department of Peacekeeping Operations and Department of Field Support, February 2008), 8. For a definition of operational control, see page 4 of this reference.

[176]United Nations, *Authority, Command and Control*..., 13-16. For a definition of tasking authority, see page 4 of this reference.

It is important to note that while there is some overlap in the capabilities of combat and military construction engineering personnel, they should not be considered interchangeable due to their respective specialized training and equipment.[177] Moreover, the primary distinguishing feature between a combat engineering and a construction engineering *task* is the close support role of combat engineering to specific elements of the mission's force (e.g., infantry) versus the general support role of construction engineering that largely provide their function to the mission as a whole. Close support entails being sufficiently near the supported force – a specific portion of the mission's ground forces such as an infantry element – to require "detailed coordination and integration regarding movement, fire, and other actions of the supported force"[178] in order to perform their mobility, counter-mobility, and survivability tasks. In contrast, general support tasks are not given to any specific portion of the mission's forces, but provide sustainability engineering functions to the entire mission force as a whole.[179] "Combat engineering is not to be confused with engineering under combat conditions, which could apply to general support and geospatial engineering activities."[180] The defining characteristic of combat engineering is its close support to land forces.

The following example can illustrate the distinction between combat and general support engineering. In early 2007, mobility support from engineers was essential to MINUSTAH operations. The UN sought to capture strongholds and key leaders of extremely savage street gangs in an effort to stabilize Cité Soleil, one of the most violent quarters of Port-au-Prince and within which local police had been unable to enter for several years.[181] One of the gangs, who

[177]Joint Chiefs of Staff, Joint Publication 3-34…, I-2.
[178]Joint Chiefs of Staff, Joint Publication 3-34, *Joint Engineer Operations* (Washington, DC: Joint Chiefs of Staff, January 6, 2016), I-3.
[179]Department of National Defence, B-GL-361-001/FP-001..., 2.
[180]Joint Chiefs of Staff, Joint Publication 3-34…, I-3.
[181]A. Walter Dorn, "Intelligence-Led Peacekeeping: The United Nations Stabilization Mission in Haiti (MINUSTAH), 2006-07," *Intelligence and National Security* 24, no. 6 (December 2009): 812, .

had known strong networks of communication, snipers, gunmen, and a habit of using women and children as human shields, constructed numerous ditches (‘tank traps’) over two meters deep as protection against offensive UN operations. Identified by aerial photos before the operation, engineers were successfully employed to rapidly fill these ditches to maintain momentum of the operation along critical routes,[182] and required close coordination with the attacking forces to perform their task. Afterwards, the engineers worked quickly to repair damage conducted during the fighting.[183] Therefore, regardless of whether combat engineers or construction engineers drove the vehicles (both types of engineers have heavy equipment drivers), the close support nature of the task made it a combat engineering task.

[182]Dorn, “Intelligence-Led Peacekeeping..., 821.
[183]A. Walter Dorn, notes provided to author, 30 April 2016.

Photo XXX[184]: On MINUSTAH in March 2007, Brazilian soldiers on provide security for an engineering heavy equipment operator conducting repairs in Cité Soleil following several hours of "heavy fighting between gangs."

The Importance of Engineers during All Phases of UN Peace Operations

No longer able to simply achieve settlements in conflicts, international conflict resolution must identify and resolve the root causes through a range of components that include military, law enforcement, political, human rights, rule of law, humanitarian, reconstruction, public information, and gender concerns.[185] As such, peace operations must be prepared to conduct a range of operations throughout a mission, including host nation assistance and capacity building, stabilization, humanitarian assistance, and development. Engineers have a critical role in achieving each of these operations, which can occur simultaneously and be required multiple times throughout a mission.

Nigerian Army Major General Moses Bisong Obi, former Force Commander for UNMISS, has commented on the significant and deleterious effect that poor mobility support had on the mission during his command.[186] Often, the engineering support needs of the military force had to complete against higher priority mission mandate engineering requirements, and thus the military force had difficulty accessing military engineering support through the mission's Joint Logistic Operation Centre. As a result, the lack of military engineering support to improve host-nation road infrastructure contributed to a high reliance on aviation support. When Russia withdrew its military helicopters in late 2011, the mission then had to rely on sharing contracted

[184]United Nations, News and Media: Photo, "UN Peacekeeping Operation in Haiti," last modified 26 March 2007, http://www.unmultimedia.org/photo/detail.jsp?id=141/141458&key=111&query=cite%20soleil&lang=en&sf=.

[185]Sheehan, *The Economics of Peacekeeping*…, 1-2.

[186]Moses Bisong Obi, "The Challenges of Land Forces in Peace Support Operations," in *United Nations Peacekeeping Challenge: The Importance of the Integrated Approach*, ed. Anna Powles, Negar Partow, and Nick Nelson (Surrey: Ashgate Publishing Limited, 2015), 79-80.

civilian aviation assets already supporting the mission who were reluctant to transport ammunition, travel at night, or had a limited area they were willing to support.[187] This greatly undermined Major General Moses' flexibility to protect civilians, complete humanitarian support, and sustain his operations.

Engineer roles in host nation support include tasks such as the completion of quick impact projects (QIPs) and capacity building. QIPs are "small-scale, rapidly-implementable projects" that sometimes include employment opportunities, are often infrastructure-related, and which are selected to benefit the local population and generate confidence in the UN mission.[188] However, QIPs are not a substitute for humanitarian or development assistance,[189]which are much larger endeavors. Capacity building can involve training and equipping of locals to conduct projects of their own. An example of host nation capacity building was heavy equipment training given to local Haitians by Japanese soldiers during their MINUSTAH participation. Fifty locals were trained, and when the Japanese departed home, they left the heavy equipment behind with numerous spare parts.[190] QIPs and capacity building efforts can be conducted currently using appropriately selected projects.

Humanitarian operations, which can be defined as "actions taken to save lives, alleviate human suffering, and/or mitigate property damage,"[191] may be conducted during peace operations, take on extremely high importance, and significantly draw on engineering capabilities. The provision of humanitarian assistance to the Shiite population of South Lebanon "became an activity of major importance" in late-1978. A major part of this effort was the

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[187]Ibid., 79-80.

[188]United Nations, Department of Peacekeeping Operations and Department of Field Support, *Quick Impact Projects (QIPs)* (New York: Department of Peacekeeping Operations and Department of Field Support, January 21, 2013), paragraphs D1-D2; United Nations, *United Nations Peacekeeping Operations*..., 30.

[189]Ibid.

[190]Boutellis and Smith, *Engineering Peace*..., 25.

[191]Canada, Department of National Defence, B-GJ-005-300/FP-001, Canadian Forces Joint Publication CFJP 3.0: Operations (Ottawa: Department of National Defence, July 2010), 6-10.

clearance of minefields and the collection of ordnance for destruction, which was requested by local leaders particularly for clearing farming fields.[192] Other engineering activities of fundamental importance to humanitarian operations can include well drilling, water production and distribution, construction of relief facilities, emergency power and illumination, debris clearance, and assistance with urban search and rescue.[193]

Engineering has also been recognized as a pivotal requirement for the conduct of successful stability operations, as the end of hostilities brings host-nation expectations that infrastructure repairs and development will occur.[194] Legitimacy of a stabilization force is central to "gaining the allegiance of the population" and achieving an enduring peace,[195] and meeting such infrastructure expectations can significantly support this aim. When legitimacy and credibility is not is not achieved, which can result from lack of clarity, capacity, or timely response to concerns or needs, local actors are likely to disengage from collaboration with the force and pursue independent efforts to achieve stabilization.[196] In April 2016, President Obama admitted in an interview that the worst mistake of his presidency was the absence of planning for the consequences following the toppling of Libyan dictator Muammar Gaddafi.[197] Physical security is the fundamental first step in stabilization, but only with a functioning government, judiciary, police, military, and essential infrastructure and services for water, energy, and transportation can long-term stabilization occur, which minimizes the potential requirement for

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[192]Erskine, *Mission with UNIFIL*..., 88-89. More recently, humanitarian demining operations are typically carried out by civilian operations.

[193]Joint Chiefs of Staff, Joint Publication 3-34…, II-10.

[194]Lieutenant Colonel David P. Cavaleri (Retired), *Easier Said Than Done: Making the Transition Between Combat Operations and Stability Operations* (Fort Leavenworth: Combat Studies Institute Press, 2005), 14.

[195]Edwin G. Corr and Max G. Manwaring, "Some Final Thoughts," in *Beyond Declaring Victory and Coming Home: The Challenges of Peace and Stability Operations*, ed. Max G. Manwaring and Anthony James Joes (Westport: Praeger Publishers, 2000), 250-251.

[196]Bellamy, "Unity of Effort…, 23, 33.

[197]Allie Malloy, "Obama Admits Worst Mistake of His Presidency," *CNN*, last modified 11 April 2016, http://www.cnn.com/2016/04/10/politics/obama-libya-biggest-mistake/index.html.

the re-entry of external security actors.[198] During stabilization operations, unity of effort and operational commitment across all relevant actors and their numerous organizational levels is imperative for achieving political and military objectives.[199] Box 3 relates the experiences of a former senior UNDP manager with on-the-ground experience in Haiti and Libya, which underlines the critical importance of engineering in stabilization and development operations.

Box 2 – Infrastructure Engineering in Fragile and Failing States

(see Appendix 4 for the unabridged notes of a discussion between Anne Demirjian and the author)

Somalia

With none of the institutions of government, Somalia has almost no infrastructure. In general, the road conditions across Somalia are deplorable. Within Mogadishu, likely less than 50 percent of the roads are trafficable and outside the capital, approximately 95 percent of the roads are not trafficable for most vehicles except large civilian or military vehicles. To complete its mandate, the UN therefore has a high reliance on developed nations to provide scarce aviation assets that allow critical mobility capabilities across even very short distances. This creates significant problems when conducting military operations, providing humanitarian assistance, and development support. Sadly, UN was often unable to distribute humanitarian assistance because there was no way to reach the locations where it was needed. The AMISOM and Somali military have jointly had successes in clearing Al-Shabaab from key towns such as Mogadishu, Kismayo and other areas. However, one area that Somali and international efforts have dismally failed is in the stabilization of liberated areas where the military/civilian interface at local and sub-national is crucial. To maintain the peace after clearing militants, interfacing with the locals

[198]Timothy Clark and Robert Johnston, "Introduction: Principles, Themes, and Problems in Transitions," in *At the End of Military Intervention: Historical, Theoretical, and Applied Approaches to Transition, Handover, and Withdrawal*, ed. Timothy Clark and Robert Johnston (New York: Oxford University Press, 2015), 2-3.

[199]Cavaleri, *Easier Said Than Done...*, 14.

is required to assess the infrastructure (roads, schools, hospitals, market places, water, sewage disposal, etc) in highest need of repair, and subsequently create a functioning system. However, none of these technical engineering assessment capacities exist in the Somali government, AU, or UN organizations in Somalia. This gap seriously undermines the credibility of these organizations within the newly liberated areas, thereby significantly impairing the potential for long-term peace in these locations.

Libya

When Libya was liberated in October 2011, bombings by the international community and local militias left some areas more impacted than others. Gaddafi was from Sirte, and during the war, it suffered the most devastating destruction of all Libyan cities with approximately 60 percent of its infrastructure destroyed. When Ms. Demirjian visited the city, the mayor stated that while he recognized the glory days of Sirte were over, he hoped it would not be forgotten during reconstruction efforts across the country. Later, engineers from the local authority had completed a rudimentary assessment of critical city infrastructure in an effort to generate a funding plan for reconstruction. Despite the sincerity of their efforts, international expertise was needed to create a professional prioritization and costing plan. However, the UN did not possess the expertise to take the plan to this next level. One of the principal reasons why ISIS gained a foothold in Sirte is that within the first year following ceasefire nothing was done with the infrastructure reconstruction plans, creating a power vacuum. While “soft” issues such as drafting a national constitution received attention, there was inadequate attention to the power vacuum that had been generated, thinking of Libya as a rich country with seven million people could bring in the best firms to reconstruct the nation themselves. Unfortunately, with poor governance, weak leadership, and internal divisions, this did not occur. The rise of extremism and ISIS filled the

local power vacuum and took over the town. Had international engineering support been available early on for Sirte and other cities and towns, they would have bridged those engineering assessment and costing capability gaps as adequate funding would have been available from the US, EU, and other international community members. The crucial matter of stabilization and reconstruction of destroyed cities, such as Sirte, are examples of dismal failures on the part of the international community.

The immense role that both combat and construction engineers play throughout the types, phases, and tasks of UN peace operations, as shown above, calls for a re-assessment of previous conceptions of the "tooth-to-tail ratio" (T3R) for describing engineering on these operations. The T3R for peace operations is typically conceived as it relates to purely combat operations, as the ratio of the portion of the military organization in a combat role versus the portion in a non-combat role (i.e., support or logistical). This concept has historically considered combat engineers as "tooth" but construction engineers as only "tail."[200] However, as shown in this study, combat and construction engineering tasks related to host nation support and capacity building, humanitarian assistance, stabilization, and development operations not only take on an important role, but may become the main effort at times during peace operations. At these times, engineering operations can be determinants of success or failure of the mission. In such situations, such engineering tasks should be considered "tooth," regardless of whether they are performed under combat conditions. As such, construction engineers – or portions thereof – could be considered either "tooth" or "tail" during a particular UN peace operation, depending on the nature of their tasks.

[200]John J. McGrath, *The Other End of the Spear: The Tooth-to-Tail Ratio (T3R) in Modern Military Operations*, The Long War Series Occasional Paper 23 (Fort Leavenworth, Combat Studies Institute Press, 2007), 4-6.

This line of analysis also brings the characterization of engineers as "enablers" into question. Describing any function as an enabler subordinates it to other functions, suggesting that it only exists to empower or facilitate the success of principal or supported functions (e.g., infantry) that hold the primary capacity to accomplish the force's mission. Describing a function as an enabler suggests that it would never be the portion of the force having a leading or principal role in operations. However, this study has shown this to be an incorrect generalization for engineering throughout the full range of operations and tasks that may occur on UN peace operations. In fact, as illustrated above, sometimes engineering can become the mission-critical function. In situations when engineers require security from infantry to accomplish their mission, the present concept of enabler is completely reversed, as in these situations it is the engineers that are the supported function and the infantry is the enabler.

Engineering has proven itself as one of the most crucial elements for achieving success during a UN peace operation – being essential from mission start-up to termination – across mission assistance, host nation assistance and capacity building, stabilization, humanitarian assistance, and development tasks. As such, it is therefore appropriate to recognize the importance of engineering by referring to countries that provide these specialized troops as "engineering contributing countries," or "ECCs." Diverse capabilities and experience exist amongst ECCs, and various levels of collaboration have occurred amongst them. Developed ECCs hold tremendous potential for improving the capacities and capabilities of developing ECCs.

SOME ENGINEERING CONTRIBUTING COUNTRIES: PAST AND PRESENT

Norway, Sweden, and Finland

Within each of the Nordic countries, participation in international operations led to demands for substantial reforms throughout the military organizations. In Norway, military inadequacy to meet political ambitions created the impetus for reform, and by 2006, it achieved capability to participate in full spectrum operations in combat and support roles.[201] Politicians in Norway typically favour an emphasis on non-military components of Norway's participation in international conflict occurrences and the humanitarian aspects of their military contributions.

Norway provided an engineer company to Operation Iraqi Freedom in 2003-2004 and its rules of engagement (ROE) were far more restrictive than other coalition nations, as the Norwegian ROE only permitted the use of force in self-defence.[202] Furthermore, the Norwegian government publically emphasised the reconstruction and humanitarian function of the engineer company, which provoked backlash from the political opposition, NGOs, and the Norwegian forces, the latter of which had seen the government's statements as a disguise of their military presence in Iraq as non-military. Upon their return home, the officer commanding the engineer company stated that the debate had been profoundly frustrating for the Norwegian troops in Iraq.[203] In addition to deploying engineer elements on its own, Norway also has experience deploying within a joint, North-North context.

In 2007, the governments of Norway and Sweden had been eager to send a joint 400-person engineering unit (160 from Sweden and 240 from Norway) to the United Nations African Union Mission in Darfur (UNAMID) to assist in infrastructure preparations during the early stage of the mission.[204] Due to opposition from Khartoum, however, the Norwegian and Swedish

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[201]Torunn Laugen Haaland, "Participation in Peace Support Operations for Small Countries: The Case of Norway," in *Peace Support Operations: Nordic Perspectives*, ed. Eli Stamnes (New York: Routlage, 2008), 56-57.

[202]Peter Viggo Jakobsen, Nordic *Approaches to Peace Operations: A New Model in the Making?* (New York: Routlage, 2006), 164.

[203]Haaland, "Participation in Peace Support Operations..., 58.

[204]Ministry of Foreign Affairs, "Norway and Sweden Withdraw Offer to UN to Contribute Forces to Darfur," accessed 21 March 2016, https://www.regjeringen.no/en/aktuelt/Norway-and-Sweden-withdraw-offer-to-UN-

government were "compelled to withdraw" the offer.[205] Khartoum wanted UN forces of African origin, referring to others as colonizers. It vetoed attempts to make the mission more powerful and truly representative of the world.[206]

At the Leaders' Summit on Peacekeeping in 2015, Norway pledged to extend its provision of camp facilities to the headquarters of the intelligence unit for a minimum of 10 months, and to "consider the possibility of deploying a combat engineer unit with counter-improvised explosive devices capabilities to a UN mission, most likely in Mali, in 2017."[207] Finland considers its peacekeepers, who are reservists that bring their civilian experiences to their military service, to be ideal for UN peace operations.[208] As former Finnish Foreign Minister, Erkki Tuomioja, stated in 2003:

> Except officers, all Finnish peacekeepers are reservists. Thus, everyone brings his or her own civilian experiences and professional skills. We try to make use of these civilian skills to the fullest extent, be these skills of constructors, teachers, engineers, or even basketball trainers.[209]

Argentina, Brazil, Chile, Paraguay, and Peru

Prior to 2004, Brazil was predominantly a small-scale troop contributor. In the past decade, however, Brazil has demonstrated increasing enthusiasm for UN peace operations,

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t/id496144/; John Heilprin, "Darfur Peacekeeping Set Back By 6 Months," *USA Today*, last modified 9 January 2016, http://usatoday30.usatoday.com/news/world/2008-01-09-2889316089_x.htm.

[205]Ministry of Foreign Affairs, "Norway and Sweden Withdraw Offer to UN to Contribute Forces to Darfur," access'continued 21 March 2016, https://www.regjeringen.no/en/aktuelt/Norway-and-Sweden-withdraw-offer-to-UN-t/id496144/.

[206]A. Walter Dorn, notes provided to author, 30 April 2016.

[207]Mission to the UN, "Leaders' Summit on Peacekeeping," last modified on 28 September 2015, http://www.norway-un.org/Statements/Archived-Statements/Statements-2015/Other-Statements/Leaders-Summit-on-Peacekeeping/#.VvCiKdIrL4Y.

[208]Unto Vesta, "Continuity and Change in the Finnish Debate on Peacekeeping," in *Peace Support Operations: Nordic Perspectives*, ed. Eli Stamnes (New York: Routlage, 2008), 86.

[209]Vesta, "Continuity and Change in the Finnish Debate..., 86.

particularly due to its status as an emerging power.[210] From 2004 onwards, in addition to leading the force and substantial troop contributions, Brazil has provided an engineering company to MINUSTAH, typically composed of approximately 200 personnel.[211] In keeping with its tendency to emphasize the development aspects of peacebuilding, Brazil has been a strong advocate for implementing QIPs to benefit and win the local population.[212] Brazil has also participated in larger engineering projects for Haiti. In September 2010, the engineering contingent completed a $2.5M USD feasibility study and the government pledged $40M USD for the 32-megawatt Artibonite 4C hydroelectric plant project to provide cleaner, cheaper energy as well as employment to thousands Haitians.[213] The project, however, remained uncertain until the Chinese offered the remaining funds for the $240M USD project. A memorandum of understanding between the Haitian government and Sinohydro, a Chinese construction firm, was signed in February 2015. The project, expected to take 36-42 months, will generate power for approximately one million Haitians in about 200,000 households, create 7,500 jobs, and irrigate 3,500 hectares of land leading to an agricultural production increase of more than $10M per year.[214]

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[210]Kai Michael Kenkel, "Out of South America to the Globe," in *South America and Peace Operations: Coming of Age*, ed. Kai Michael Kenkel (New York: Routlage, 2013), 98-99.

[211]Kai Michael Kenkel, "Brazil," in *Providing Peacekeepers: The Politics, Challenges, and Future of United Nations Peacekeeping Contributions*, ed. Alex J. Bellamy and Paul D. Williams (Oxford: Oxford University Press, 2013), 348.

[212]Kenkel, "Out of South America..., 100.

[213]United Nations, "Haiti's 'Steady Progress' Justifies Recommendation to Extend Peacekeeping Mandate, Secretary-General's Special Representative Tells Security Council," last modified 3 October 2012, http://www.un.org/press/en/2012/sc10780.doc.htm; *Haiti Libre*, "Haiti – Energy : 191 million for hydroelectric project," last modified 30 September 2010, http://www.haitilibre.com/en/news-1308-haiti-energy-191-million-for-a-hydroelectric-project.html.

[214]David Rogers, "Major Power Boost for Haiti as Chinese Firm Agrees to Finance $240m Dam," *Global Construction Review*, last modified 10 February 2015, http://www.globalconstructionreview.com/news/major-power-boost-haiti-chi8ne8s8e-f8i8r8m-a8gr8ee/.

The Brazilian engineering company on MINUSTAH has provided other infrastructure projects to the Haitian people such as bridges, roads, and wells.[215] With the consolidation of the MINUSTAH mission underway, and the "right-sizing" of the military component from approximately 5,000 troops to 2,400 troops, the three total engineering companies on the mission have been reduced to two small engineering companies.[216] The first, the Brazilian engineering company, is 120-personnel strong, and must be capable of site preparations including topographical and boundary site surveys, limited vertical camp construction, clearing of rubble, power supply services, road and bridge repair and maintenance, boat team, rehabilitation and reconstruction of boat ramps to facilitate maritime operations, and well drilling and water treatment/distribution operations, and numerous other tasks.[217] The other engineering company presently deployed on MINUSTAH, provided by Paraguay, is 82-personnel strong and is required to complete very similar tasks to the Brazil engineer company except not having the requirement to provide EOD, boat team, or well drilling capabilities.[218]

In December, the joint combined peace force *Brigada Cruz del Sur* (Southern Cross Brigade), which includes an engineering company, was formed by Argentina and Chile specifically for use on peace operations.[219] The bilateral brigade was created to reduce costs associated with projecting their forces internationally, to strengthen negotiations with the UN for reimbursement, to enhance bilateral confidence-building measures, and has served as an example of the strength of South American countries to effectively collaborate despite history of

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[215]Kenkel, "Out of South America..., 101.

[216]United Nations, *The United Nations Stabilization Mission in Haiti (MINUSTAH), The Statement of Unit Requirement for Brazil Engineer Company* (New York: Department of Peacekeeping Affairs, 30 June 2015), 3.

[217]United Nations, *The United Nations Stabilization Mission in Haiti (MINUSTAH), The Statement of Unit Requirement for Brazil...*, 4-5.

[218]United Nations, *The United Nations Stabilization Mission in Haiti (MINUSTAH), The Statement of Unit Requirement for Paraguay Engineer Company* (New York: Department of Peacekeeping Affairs, 30 June 2015), 3.

[219]Danilo Marcondes de Souza Neto, "Regional defense integration and peacekeeping cooperation in the Southern Cone," in *South America and Peace Operations: Coming of Age*, ed. Kai Michael Kenkel (New York: Routlage, 2013), 75.

rivalry.[220] In June 2011, the two nations and the UN signed an agreement placing the Brigade on the UNSAS list,[221] and in July 2015, the two countries committed to conducting engineering exchanges and apprenticeships amongst other efforts to strengthen the bilateral arrangement.[222] To enable expansion of the bilateral initiative into a multinational one, the memorandum of understanding that established the company permits the incorporation of additional states.[223]

In addition to the Southern Cross Brigade, other South American countries have created similar bilateral arrangements. From 2005 to the beginning of mission consolidation in 2015, Chile and Ecuador contributed to a combined engineering company in Port-au-Prince to MINUSTAH in support of infrastructure rebuilding and other tasks.[224] In addition, in 2008 Peru and Argentina created the concept for the combined Company of Engineers "Liberador Don Jose de San Martin," the impetus for which was deployment on MINUSTAH. [225] Composed of 168 personnel, the engineering company was specifically designed to address some of the most urgent humanitarian needs of the Haitian population, especially water collection, purification, and distribution in highly urban areas as well as housing and other critical infrastructure deficiencies of the most vulnerable populations.[226] Yet, as of May 2016, the company has not yet

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[220]Neto, "Regional defense integration…, 75.

[221] Rut Diamint, "From Fear to Humanitarianism: Changing Patterns in Argentina's Involvement in Peace Operations," in *South America and Peace Operations: Coming of Age*, ed. Kai Michael Kenkel (New York: Routlage, 2013), 140.

[222]Julieta Pelcastre, "Armed Forces of Argentina and Chile Bolster Ties at Bilateral Meeting," *Diálogo*, last modified 13 July 2015, http://dialogo-americas.com/en_GB/articles/rmisa/features/2015/07/13/feature-02.

[223]Anabella Busso, *Regional Contributions to Multifunctional Peacekeeping Operations: Best Practices and Main Challenges: A Look from Latin America* (Stockholm: International Forum for the Challenges of Peace Operations, 2013), 9.

[224]Andreas E. Feldmann and Juan Esteban Montes, "Learning to Be Likeminded: Chile's Involvement in Global Security and Peace Operations Since the End of the Cold War," in *South America and Peace Operations: Coming of Age*, ed. Kai Michael Kenkel (New York: Routlage, 2013), 154;, "Peacekeeping Contributor Profile: Chile," Dr. Kristina Mani and Alejandro Amigo. *Providing for Peacekeeping*, last modified January 2016, http://www.providingforpeacekeeping.org/2014/04/03/contributor-profile-chile/; Neto, "Regional defense integration…, 76.

[225]Diamint, "From Fear to Humanitarianism…, 140.

[226]Christian Bonfili, "Peacekeeping Contributor Profile: Argentina," *Providing for Peacekeeping*, last modified January 2013, http://www.providingforpeacekeeping.org/2014/04/03/contributor-profile-argentina/.

deployed.[227] Although bilateral talks in April 2015 between the Joint Chiefs of Staff from both nations affirmed their ongoing mutual interest in establishing the company and the topic may be raised again during a new round of bilateral talks in October 2016, it is presently uncertain if the initiative will move forward.[228]

In November 2015, Peru deployed an Airfield Construction and Maintenance Company, composed of 160 military engineers and a 45-person security force, to work on 35 airfields in the Central African Republic. The contingent deployed with front loaders, bulldozers, steamrollers, steam shovels, water tanker trucks, fuel, engines, and combat vehicles.[229] On 27 January 2016, Chile's parliament approved the deployment of a horizontal engineering company (amongst other assets) to MINUSCA, fulfilling the pledge made by Chilean President Michelle Bachelet at the Leaders' Summit on Peacekeeping in September 2015.[230]

China

Since its admission into the UN in 1971, the People's Republic of China (China) has displayed an increasingly positive attitude toward UN peace operations. This progression has been closely linked to China's search for soft power, fulfillment of national interests, and its gradually evolving attitudes on the principles regarding state sovereignty.[231] China was initially highly critical of UN peace operations as illegitimate interference on a state's sovereignty. Yet

[227]W. Alejandro Sanchez, email to author, 3 May 2016; Bianca Selway, *Beyond Haiti: Enhancing Latin American Military and Police Contributions to UN Peacekeeping* (New York: International Peace Institute, 2014), 2-3.

[228]W. Alejandro Sanchez, email to author, 3 May 2016.

[229]Ximena Moretti, "Peruvian Armed Forces to Deploy Military Engineers to the Central African Republic," *Diálogo*, last modified 15 September 2015, http://dialogo-americas.com/en_GB/articles/rmisa/features/2015/09/15/feature-03.

[230]Carolina Contreras, "Chilean Armed Forces Join Peacekeeping Mission in Central African Republic," *Diálogo*, last modified 26 February 2016, http://dialogo-americas.com/en_GB/articles/rmisa/features/2016/02/26/feature-07?source=most_emailed.

[231]Bates Gill and Chin-Hao Huang, "The People's Republic of China," in *Providing Peacekeepers: The Politics, Challenges, and Future of the United Nations Peacekeeping Contributions*, ed. Paul Williams and Alex J. Bellamy (Oxford: Oxford University Press, 2013), 140-142.

today, UN peace operations participation is part of China's strategy in pursuit of great power status. China is the world's sixth largest troop contributor to such operations and is by far the largest contributor amongst the permanent members of the UNSC.[232]

China's UN peace operations troop deployments until 2013 were non-combat troops that would assist in maintaining their non-intervention position, including engineering, medical, and logistical personnel.[233] In particular, the majority of China's contribution of personnel to UN PO from 1999 to the present have deployed to the continent of Africa, more precisely to Sub-Saharan Africa.[234] While some see this participation as positive assistance to the overstretched UN, others, such as media and military analysts, have viewed it with skepticism, believing China is merely striving to advance its economic and geostrategic interests.[235] For example, Chinese military engineers deployed on MONUSCO are stationed in South Kivu, where most of the mining within the Democratic Republic of the Congo's (DRC) takes place, and have assisted in repairing roads in that vicinity.[236] From 2000, China's trade with Sub-Saharan Africa has increased by approximately five percent per year, from near-negligible levels to a total of $170B USD in 2013.[237] Furthermore, and in addition to enormous Chinese support to African infrastructure and road construction projects, China funded the new African Union headquarters building in Addis Ababa that was completed in 2012.[238]

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[232]United Nations, "Troop and Police Contributors," accessed 25 March 2016, http://www.un.org/en/peacekeeping/resources/statistics/contributors.shtml.

[233]Courtney J. Richardson, "A Responsible Power? China and the UN Peacekeeping Regime," *International Peacekeeping* 18, no. 3 (June 2011): 288.

[234]Ibid.

[235]Library of the European Parliament, "China's Role in UN Peacekeeping Operations," Library Briefing 120387REV1, accessed 6 November 2015, http://www.europarl.europa.eu/eplibrary/China-role-in-UN-peacekeeping-operations.pdf.

[236]Fanie Herman, *China's African Peacekeeping Decision-Making in the Hi Jintao Era* (Delhi: Vij Books India Pvt Limited, 2015), Chapter 6.

[237]World Bank, *Global Economic Prospects: The Global Economy in Transition* (Washington, DC: World Bank, 2015), 163.

[238]Gill and Huang, "The People's Republic of China..., 152.

In 1992 and 1993, in its first deployment of a formed military unit to a UN peace operation – China had previously sent military observers to the Western Sahara in 1989 and to the Middle East in 1990 – China sent two engineering units to the UN Transition Authority in Cambodia (UNTAC) where it conducted demining and other tasks.[239] In March 2003, a 175-person engineering company was amongst its troop contributions to the UN Organization Mission in the Democratic Republic of the Congo (MONUC), and in December 2004, a 275-person engineering company was amongst its troop contributions to UNIMIL.[240] From 2005 to 2011, China sent 13 separate engineering organizations to UN Mission in the Sudan (UNMIS).[241] In December 2007, after Sudan continuously denied entry of non-African troops to participate in the UN-African Union Mission in Darfur (UNAMID), it was a Chinese military engineering contingent, eventually 315-strong, that were the first non-African troops permitted to participate in the mission.[242] The Chinese engineering contribution was critical to building a supercamp in Nyala and expanding infrastructure in other locations in Darfur to permit additional UN troops to deploy. In addition, the Chinese engineers provided road and bridge construction, vertical construction, and for the mission and local QIPs, well-drilling capabilities.[243] In January 2014, a 155-person engineering company was deployed as part of China's contingent to MINUSMA, who were tasked with building a UN "supercamp" to accommodate all the UN regional offices in

[239]Jiaxiang Hu, "China's Participation in PKOs," in *China's and Italy's Participation in Peacekeeping Operations*, ed. Andrea de Guttry, Emanuele Sommario, and Lijiang Zhu (Lanham: Lexington Books, 2014), 39.

[240]Jiaxiang Hu, "China's Participation in PKOs…, 40.

[241]Sanzhuan Guo, "The Peacekeeping Decision-Making Process and the Modality of Financing in China," in *China's and Italy's Participation in Peacekeeping Operations*, ed. Andrea de Guttry, Emanuele Sommario, and Lijiang Zhu (Lanham: Lexington Books, 2014), 39.

[242]Fung, "What Explains China's Deployment..., 12, 17.

[243]United Nations, United Nations News Centre, "Chinese Engineers Arrive to Support Joint UN –African Union Mission in Darfur," last modified 17 July 2008, http://www.un.org/apps/news/story.asp?NewsID=27410&#.Vvb6f9IrL4Y; United Nations, African Union – United Nations Mission in Darfur, "UNAMID Welcomes Chinese Engineers to Build Camps," last modified 1 December 2008, http://unamid.unmissions.org/unamid-welcomes-chinese-engineers-build-camps.

one location.[244] As of January 2016, China has supplied 14 engineering detachments to UNIFIL. The current detachment, composed of 180-person minesweeping engineering detachment and a 20-person construction engineering detachment, was tasked with mine clearance operations, EOD services, Lebanon-Israel border marking, road construction, fortification building, and humanitarian aid.[245] China has sent almost 20 engineering detachments under MONUSCO, with the present engineering force being over company size and tasked with building and maintaining roads and bridges as well as building water and power supply facilities.[246]

At the Leaders' Summit on Peacekeeping, President Xi announced (amongst other items): (i) China's pledge to provide 8,000 troops to a UN standby force including engineers (ii) a 10-year, $1B USD UN-China "peace and development fund" to advance the UN's efforts for multilateral solutions toward international peace and security, and (iii) $100M USD over the next five years for the African Union to establish an African Standby Force. [247] Following these announcements, Zhang Guihong, Director of the Centre for UN Studies at Fudan University in Shanghi, surmised that by 2018 China will be amongst the three largest contributors of personnel to peace operations.[248]

Japan

Domestic legalization of Japanese Self Defence Forces (SDF) participation in peace operations following an approximately forty-year old ban was achieved in June 1992 through the

[244]Dulcie Leimbach, "China Takes a Peacekeeping Risk in Mali," *PassBlue*, last modified 4 March 2014, http://passblue.com/2014/03/04/china-takes-a-peacekeeping-risk-in-mali/.

[245]China, Ministry of National Defense, "14th Chinese Peacekeeping Force to Lebanon Heads Out," last modified 20 May 2015, http://eng.mod.gov.cn/DefenseNews/2015-05/20/content_4585919.htm.

[246]China, China Military Online, "19th Chinese Peacekeeping Force to Congo (K) Sets Out," last modified 22 September 2015, http://english.chinamil.com.cn/news-channels/china-military-news/2015-09/22/content_6693334.htm.

[247]*The Economist*, "Xi and the Blue Helmets," 3 October 2015, 45-46.

[248]Ibid.

Act on Cooperation for United Nations Peacekeeping Operations and Other Operations.[249] This change from its former minimalist interpretation of the Constitution to more practical terms was supported by Japan's belief that it should be enabled to participate in UN peace operations, as the renunciation of war and or even the "threat or use of force" within Japan's Constitution is in the same spirit as the UN Charter.[250] However, this legislation only permitted Japan to deploy non-combat personnel, such as engineering, medical, and logistical troops.[251] However, XXXXXXXX. Canada has voiced its support for Japan to become more internationally active with its military forces.[252] The Japanese SDF are considered a professional military with high morale, trained to high standards, and possessing advanced technology who are particularly noted for their engineering expertise.[253]

Japan's first expeditionary deployment since the World War Two was UNTAC. The vast majority of their personnel contribution to the mission, and their only military personnel, were consecutive deployments of 600-strong engineering units from September 1992 to April 1993 and March 1993 to September 1993.[254] These units were specifically tasked with rebuilding and repair of roads and bridges along the "badly deteriorated" Highways 2 and 3 south of Phnom

[249]Katsumi Ishizuka, "Peacekeeping Contributor Profile: Japan," last modified January 2013, http://www.providingforpeacekeeping.org/2014/04/03/contributor-profile-japan/.

[250]Yasuhiro Takeda, "Sino-Japanese Relations: The Need for Conflict Prevention and Management," in *Sino-Japanese Relations: The Need for Conflict Prevention and Management*, ed. Niklas Swanström and Ryosei Kokubun (Newcastle Upon Tyne: Cambridge Scholars Publishing, 2008), 50.

[251]Katsumi Ishizuka, "Peacekeeping Contributor Profile: Japan," last modified January 2013, http://www.providingforpeacekeeping.org/2014/04/03/contributor-profile-japan/.

[252]Lee Berthiaume, "Canada Voices Support for a More Internationally Involved Japanese Military," Ottawa Citizen, last modified 12 February 2016, http://www.ottawacitizen.com/news/canada+voices+support+more+internationally+involved+japanese/11716918/story.html.

[253]Katsumi Ishizuka, "Peacekeeping Contributor Profile: Japan," last modified January 2013, http://www.providingforpeacekeeping.org/2014/04/03/contributor-profile-japan/.

[254]Japan, Ministry of Foreign Affairs, "II. Japanese Participation in UN Peacekeeping: CAMBODIA," accessed 30 April 2016, http://www.mofa.go.jp/policy/un/pko/pamph96/02_2.html.

Penh in Takeo Province, which were damaged during the civil war.[255] Using military and commercial assets, Japan self-deployed most heavy equipment by sealift to the port of Sihanoukville, as well as airlifted personnel and other equipment to the airbase at Pochentong near Phnom Penh.[256] Despite receiving persistent unreliable support from UNTAC regarding the timely delivery of engineering materials such as gravel and asphalt,[257] as well as the ubiquitous threat of mines and extremely high temperatures,[258] Japanese engineers rehabilitated 80 kilometers and 40 bridges during the mission.[259] At the request of UNTAC, and with the permission of the Japanese government, the contingent supplied food, medical care, and accommodations to UN personnel, and provided fuel and water and to other UN units.[260] Japan also provided site preparation to a deploying French battalion.[261] UNTAC engineering projects such as those provided by the Japanese provided direct benefits the local population as well as access to remote areas for electoral teams.[262]

Japan sent a water purification team as part of a larger contingent operating in refugee camps near Goma, Zaire, from September to December 1994, in support of the UN Assistance Mission for Rwanda (UNAMIR).[263] Japan's largest commitment of personnel to date was

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[255]Hugo Dobson, *Japan and United Nations Peacekeeping: New Pressures, New Responses* (New York: RoutledgeCurzon, 2003), 100, 103; Lieutenant-Colonel Andrew H. N. Kim, "Japan and Peacekeeping Operations," *Military Review* 74, no. 4 (April 1994): 29-30.

[256]L. William Heinrich, Jr., Akiho Shibata, and Yoshihinde Soeya, *United Nations Peace-keeping Operations: A Guide to Japanese Policies* (Tokyo: United Nations University Press, 1999), 90.

[257]Kim, "Japan and Peacekeeping…, 30.

[258]Japan, Ministry of Foreign Affairs, "II. Japanese Participation in UN Peacekeeping: CAMBODIA," accessed 30 April 2016, http://www.mofa.go.jp/policy/un/pko/pamph96/02_2.html.

[259]L. William Heinrich, Jr., Akiho Shibata, and Yoshihinde Soeya, *United Nations Peace-keeping Operations: A Guide to Japanese Policies* (Tokyo: United Nations University Press, 1999), 90.

[260]Heinrich, Shibata, and Soeya, *United Nations Peace-keeping...*, 90.

[261]Kim, "Japan and Peacekeeping…, 30.

[262]United States General Accounting Office, *U.N. Peacekeeping: Lessons Learned in Managing Recent Missions*, GAO/NSIAD-94-9 (Washington, DC: United States General Accounting Office, December 29, 1993), 49, 54.

[263]Katsumi Ishizuka, "Peacekeeping Contributor Profile: Japan," *Providing for Peacekeeping*, last modified January 2013, http://www.providingforpeacekeeping.org/2014/04/03/contributor-profile-japan/; Heinrich, Shibata, and Soeya, *United Nations Peace-keeping...*, 91.

between March 2002 and June 2004 to the United Nations Transitional Administration in East Timor (UNTAET) and its successor operation, the United Nations Mission of Support in East Timor (UNMISET). Apart from a small number of staff officers and liaison personnel, Japan's contribution was engineering personnel, successively sending four separate engineer units possessing up to 680 personnel.[264] The engineers unit was divided into four companies, working in the separate locations of Dili, Malana, Oecusse, and Suai, and completed projects including maintenance of roads and bridges, paving Dili airport, maintaining and operating water supply points, and civilian support such as landscaping the grounds of primary schools.[265] SDF personnel in these deployed engineer units included women, an acknowledgement by Japan of the need for an expanded role for women on peace operations.[266]

From February 2010 to December 2012, Japan successively provided engineering units of up to 350 personnel – a total of 2,200 personnel – to support MINUSTAH following the earthquake in January 2010.[267] Tasks included clearing debris and rubble from the streets and destroyed government buildings, repairing the road to the international border with the Dominican Republic, constructing and maintaining camps for internally displaced persons, and

[264]Japan, Cabinet Office, Secretariat of International Peace Cooperation Headquarters, "International Peace Cooperation Assignment in East Timor," accessed 30 April 2016, http://www.pko.go.jp/pko_e/result/e_timor/e_timor07.html.

[265]Katsumi Ishizuka, "Japan's Policy Towards UN Peacekeeping Operations," in *UN Peace Operations and Asian Security*, ed. Mely Caballero and Amitav Acharya (New York: Routledge, 2005), 64-65; Japan, Cabinet Office, Secretariat of International Peace Cooperation Headquarters, "International Peace Cooperation Assignment in East Timor," accessed 30 April 2016, http://www.pko.go.jp/pko_e/result/e_timor/e_timor07.html.

[266]Japan, Cabinet Office, Secretariat of International Peace Cooperation Headquarters, "International Peace Cooperation Assignment in East Timor," accessed 30 April 2016, http://www.pko.go.jp/pko_e/result/e_timor/e_timor07.html.

[267]Jun Yamazaki, Deputy Permanent Representative of Japan to the United Nations (Statement at the Securty Council Meeting on MINUSTAH, New York, 24 March 2014), accessed 30 April 2016, http://www.un.emb-japan.go.jp/statements/yamazaki032414.html; Japan, Cabinet Office, Secretariat of International Peace Cooperation Headquarters, "International Peace Cooperation in Haiti," accessed 30 April 2016, http://www.pko.go.jp/pko_e/result/haiti/haiti02.html.

building shelters for orphans.[268] In addition to the SDF engineers, Japan contributed more than $150M USD from 2010 onwards for the reconstruction of Haiti, including approximately $6.8M USD for a water treatment plant in Leogane and approximately $7M USD for a hospital in Jacmel.[269] Before departing Haiti, Japan trained 50 Haitians to operate their heavy equipment, and then left donated 14 pieces of heavy equipment as well as several spare parts to the Haitian government.[270]

On 20 December 2011, augmenting the two staff officers already deployed, the Japanese cabinet authorized the deployment of an engineering unit of up 330 personnel to UNMISS.[271] Upon arrival, the unit commenced projects associated with construction, maintenance, and repair of roads in and around the capital of Juba (e.g., Yei Road).[272] The major upgrades associated with this work brought improved quality of living and traffic flow to the local population.[273] In May 2013, in response to a request from UMISS, Japan expanded the area of operations of the engineering unit to include Eastern and Western Equatoria states located in the southern portion of South Sudan in order to increase nation building opportunities and "deepen its cooperation toward UNMISS."[274] On 15 October 2013, the Japanese cabinet authorized increased personnel

[268]Japan, Cabinet Office, Secretariat of International Peace Cooperation Headquarters, "International Peace Cooperation in Haiti," accessed 30 April 2016, http://www.pko.go.jp/pko_e/result/haiti/haiti02.html.

[269]Jun Yamazaki, Deputy Permanent Representative of Japan to the United Nations (Statement at the Securty Council Meeting on MINUSTAH, New York, 24 March 2014), accessed 30 April 2016, http://www.un.emb-japan.go.jp/statements/yamazaki032414.html.

[270]Boutellis and Smith, *Engineering Peace*..., 25.

[271]Japan, Ministry of Foreign Affairs, "Dispatch of the International Peace Cooperation Corps (Engineering Unit) to the United Nations Mission in the Republic of South Sudan (UNMISS)," last modified 20 December 2011, http://www.mofa.go.jp/announce/announce/2011/12/1220_02.html.

[272]Japan, Cabinet Office, Secretariat of International Peace Cooperation Headquarters, "International Peace Cooperation Assignment in South Sudan," accessed 30 April 2016, http://www.pko.go.jp/pko_e/result/s_sudan/s_sudan02.html.

[273]United Nations, News and Media: Photo, "Japanese UNMISS Engineering Peacekeepers Upgrade Roads Around Juba," last modified 15 August 2012, http://www.unmultimedia.org/s/photo/detail/523/0523130.html.

[274]Japan, Cabinet Office, Secretariat of International Peace Cooperation Headquarters, "International Peace Cooperation Assignment in South Sudan," accessed 30 April 2016, http://www.pko.go.jp/pko_e/result/s_sudan/s_sudan02.html.

and equipment for the engineering unit to assist in covering the expanded area of operations; in March 2015, the strength of the engineering unit was approximately 350 personnel.[275]

Canada

Canadian Armed Forces deployed a contingent to Belet Uen on UNOSOM II, which included combat and construction engineers. Water treatment, for military and humanitarian purposes, was accomplished by employing a reverse osmosis water purification unit, a containerized water treatment plant, which filtered water from the Shebelli River.[276] (may be info in Somalia Report)

IMPROVING DEVELOPING NATIONS AS ECC'S

The increasing need for troops to participate in peace operations organized by the UN and other regional organizations corresponds with the growing movement for Western (North) nations to create programs that train, equip, and provide the necessary resources to the forces of developing (South) nations – particularly those providing the largest troop contributions. These programs are designed to close some capacity and capability gaps on peace operations. Certain programs specifically include provisions for augmenting specialized capabilities such as engineering, medical, and logistics. Hence, the respective programs' objectives are to increase the numbers of well-trained and sufficiently equipped troops that will possess the skills required to deploy on peace operations of increasing complexity.[277] Two programs that include such provisions for increasing engineering capabilities of selected developing nations will be detailed

[275]Japan, Ministry of Defense, "SDF's Contribution to UNMISS," *Japan Defense Focus* no. 63 (April 2015): 2.
[276]Willig, "Hydrogeology and the *Bundeswehr*..., 256-257.
[277]Major General Michael Rothstein, Deputy Assistant Secretary for Plans, Programs, and Operations, Bureau of Political-Military Affairs, Department of State (testimony to the Senate Foreign Relations Committee, Washington, DC, 13 April 2016), accessed 25 April 2016, http://www.state.gov/t/pm/rls/rm/2016/255795.htm.

– the US' Global Peace Operations Initiative and the Triangular Partnership Project that was recently facilitated by Japan and the UN department of Field Support (DFS). Recommendations for increasing the effectiveness of engineering components of training programs in the future will be made.

Global Peace Operations Initiative

The US' Global Peace Operations Initiative (GPOI) was the signature program of the George W. Bush Administration that addressed expanding personnel shortfalls for peace operations.[278] Established in 2005, the program's preliminary goal was to train 75,000 international troops by 2010 for deployment on peace operations. GPOI incorporated two previously existing training programs: the African Contingency Operations Training and Assistance Program (ACOTA) and the Enhanced International Peacekeeping Capabilities Program. ACOTA remains the moniker of the African component of GPOI.[279] As of April 2016, GPOI has enabled the deployment of more than 200,000 troops from over 50 partner nations to 29 peace operations and has directly supported in excess of 20 peace operations training centres around the world.[280] In addition, the program claims to have "directly advanced the will and

[278]Nina M. Serafino, *The Global Peace Operations Initiative: Background and Issues for Congress* (Washington, DC: Congressional Research Service, June 11, 2009), 1.

[279]United States, Department of State, "GPOI History," last modified 20 January 2009, http://2001-2009.state.gov/t/pm/ppa/gpoi/c20197.htm.

[280]Serafino, *The Global Peace Operations Initiative*..., 2; United States, Department of State, Global Peace Operations Initiative (GPOI): Fact Sheet," last modified 17 June 2015, http://www.state.gov/r/pa/prs/ps/2015/06/243940.htm; Major General Michael Rothstein, Deputy Assistant Secretary for Plans, Programs, and Operations, Bureau of Political-Military Affairs, Department of State (testimony to the Senate Foreign Relations Committee, Washington, DC, 13 April 2016), accessed 25 April 2016, http://www.state.gov/t/pm/rls/rm/2016/255795.htm.

ability of partner nations" to deploy to higher-risk environments and generate various specialized capabilities including engineering troops.[281]

A recent example of GPOI support to bolstering engineering capabilities of developing nations was a donation in March 2015 of $1.8M USD in new heavy equipment to the Nepal Army's Birendra Peace Operations Training Centre in Panchkhal.[282] Nepal is currently the fifth-largest TCC[283] and is one of the few nations to champion the deployment of women on peace operations. The donation included bulldozers and excavators, as well as a dump truck, steam roller, backhoe, water tank truck, ambulance, and several pickup trucks.[284] This equipment will be used for infrastructure improvements at the training centre, on pre-deployment training, and on peace operations.[285] In particular, the heavy equipment was cited as enabling the training of engineering battalions to conduct military and civilian infrastructure projects, such as building and maintaining roads, and construction of buildings including schools for the civilian population.[286]

Triangular Partnership Project

At Vice-President Biden's summit on peacekeeping in September 2014, Japan announced $40M USD in support for the UN Project for the African Rapid Deployment of Engineering

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[281]Major General Michael Rothstein, Deputy Assistant Secretary for Plans, Programs, and Operations, Bureau of Political-Military Affairs, Department of State (testimony to the Senate Foreign Relations Committee, Washington, DC, 13 April 2016), accessed 25 April 2016, http://www.state.gov/t/pm/rls/rm/2016/255795.htm.

[282]Kate Frier, "GPOI Delivers Heavy Engineering Equipment to Nepal for Peacekeeping Missions," *Dipnote* (Official Blog of the United States Department of State), 15 April 2015, https://blogs.state.gov/stories/2015/04/15/gpoi-delivers-heavy-engineering-equipment-nepal-peacekeeping-missions.

[283]United Nations, "Troop and Police Contributors," accessed 25 March 2016, http://www.un.org/en/peacekeeping/resources/statistics/contributors.shtml.

[284]*Spotlight Nepal*, "U.S. Embassy Turns Over $1.8 Million in Peacekeeping Equipment," 6 March 2015, http://www.spotlightnepal.com/News/Article/US-Ambassador-Handed-Equipment-Nepal-Army.

[285]*The Economic Times*, "US Provides $1.8 Million Engineering Equipment to Nepal," 7 March 2015, http://articles.economictimes.indiatimes.com/2015-03-07/news/59869423_1_nepal-army-training-centre-panchkhal.

[286]Kate Frier, "GPOI Delivers Heavy Engineering Equipment to Nepal for Peacekeeping Missions," *Dipnote* (Official Blog of the United States Department of State), 15 April 2015, https://blogs.state.gov/stories/2015/04/15/gpoi-delivers-heavy-engineering-equipment-nepal-peacekeeping-missions.

Capabilities (ARDEC).[287] Japan's commitment to improving engineering capabilities in African nations subsequently led to the Triangular Partnership Project (TPP) ARDEC training course, a recent collaboration between Japan, DFS, and the East African Community countries of Kenya, Uganda, Tanzania, and Rwanda. The course, which included support from UNOPS, is one of many programs planned by the UN and UNSOA – the United Nations Support Office for the African Union Mission in Somalia (AMISOM).[288] With the TPP's aim of reducing consistent shortfalls in engineering personnel for UN and AU peace operations in Africa, the course utilized 11 Japanese military personnel to train 10 military personnel from the participating East African Community nations.

Occurring over a six-week period in September/October 2015 at the Humanitarian Peace Support School in Nairobi, Kenya, the TPP course provided "the necessary proficiency and tactical skills to the participants in the operation and maintenance of heavy engineering equipment to prepare them for potential deployment to UN/AU [peace operations]."[289] Increasing the engineering capacity and readiness of participating forces to deploy on peace operations, the course additionally provided students with instruction on equipment handling best practices and procurement processes.[290] The heavy equipment purchased for the TPP was left to help equip the AU for future missions, as AMISOM and the AU in general must consistently

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[287]United Nations Support Office for AMISOM, "Kenya's Cabinet Secretary of Defence Launches Trial Training for the Triangular Partnership Project," last modified 8 September 2015, https://unsoa.unmissions.org/kenya%E2%80%99s-cabinet-secretary-defence-launches-trial-training-triangular-partnership-project; Japan, Ministry of Foreign Affairs, "Statement by His Excellency, Mr. Shinzo Abe, Prime Minister of Japan At the 2nd Leader's Summit on Peacekeeping at the 2nd Leader's Summit on Peacekeeping," last modified 29 September 2015, http://www.mofa.go.jp/fp/ipc/page1e_000048.html.

[288]*Daily Nation*, "Military Officers Trained on Peacekeeping Skills," last modified 18 October 2015, http://www.nation.co.ke/news/Military-officers-trained-on-peacekeeping-skills/-/1056/2919864/-/n4r6mg/-/index.html.

[289]Kenya, International Peace Support Training Centre, "The Opening Ceremony of the Triangular Partnership Project Rapid Deployment of Engineering Capabilities of African Countries Training Held on 7 September 2015 at HPSS," no date listed, http://www.ipstc.org/Triangular-Patnership-Sept2015.aspx.

[290]*Daily Nation*, "Military Officers Trained on Peacekeeping Skills," last modified 18 October 2015, http://www.nation.co.ke/news/Military-officers-trained-on-peacekeeping-skills/-/1056/2919864/-/n4r6mg/-/index.html.

struggle with specialist equipment shortfalls. Provision of this equipment can provide a significant tactical advantage forces for AU forces. For example, during a period of high intensity combat in Mogadishu, AMISOM armoured bulldozers acquired from a bilateral donor proved vital during the breaching of Al-Shaabab trenches.[291]

With the particular challenges faced by peace operations in Africa, including remote, poor, non-permissive environments with little to no existing infrastructure, Harinder Sood, Project Manager for the TPP at UNHQ in New York stated that "[i]n such a context, the capability that this project intends to build cannot be over emphasized."[292] This course was a trial-sized endeavour in preparation for future full-scale courses. The next course is projected to take place as early as June 2016, possibly taking place elsewhere in Africa.[293]

[291]Matt Freear and Cedric de Coning, "Lessons from the African Union Mission for Somalia (AMISOM) for Peace Operations in Mali," *Stability* 2, no. 2 (June 2013): 6. The reference did not contain the date of this operation.

[292]United Nations Support Office for AMISOM, "Kenya's Cabinet Secretary of Defence Launches Trial Training for the Triangular Partnership Project," last modified 8 September 2015, https://unsoa.unmissions.org/kenya%E2%80%99s-cabinet-secretary-defence-launches-trial-training-triangular-partnership-project.

[293]Seana K. Magee, "Japan Can Deploy its Strengths in Many Ways in Peacekeeping Missions, U.N. Official Says," *The Japan Times*, last modified 21 January 2016, http://www.japantimes.co.jp/news/2016/01/21/national/politics-diplomacy/japan-can-deploy-strengths-many-ways-peacekeeping-missions-u-n-official-says/#.Vx6rTNQrL4Y.

Photo XXX[294]: A soldier from the Kenya Defence Forces demonstrates his new skills on a grader after completing a trial-sized Triangular Partnership Project course in Nairobi, Kenya.

Recommendations for Ensuring Maximized Benefits from North-South Engineering Training

Many nations, such as those in the training program examples above, share the view that North-South training programs are a relatively inexpensive means of bolstering much needed forces for deployment on peace operations through transfer of knowledge, experience, and technology. Furthermore, these collaborations are seen as a means to improve cooperative relations with partner nations, as well as improve partner nations' domestic and regional aid delivery capacity (e.g., humanitarian and natural disaster response).[295] However, criticism of

[294]Kenya, Ministry of Defence, "Triangular Partnership Project," accessed 26 April 2016, http://www.mod.go.ke/?p=5515.

[295]Kenji Hirata, "Triangular Cooperation: Japan's Experience" (presentation, Embassy of Japan in Mexico, no date listed), accessed 26 April 2016, http://www.oecd.org/dac/dac-global-relations/43877022.pdf.

many of these programs include that they often lack a long-term and comprehensive concept, ultimately contributing to short-lived operational readiness. Capacity building collaborations have brought benefits, while best practices for these programs, not always adhered to in the past, must guide future initiatives to maximize their potential benefits. Some of these best practices include considerations for skill retention after initial training, ongoing use and maintenance of donated equipment, and interoperability with international and regional partners.

Maximizing Skills Retention

Most capacity building programs point to the numbers of trainees that have been produced through their support. These numbers, while they can be impressive, can also be misleading. As with many other skills, military skills are perishable and must be maintained. Military engineers, in particular, require constant practice to preserve expertise. Data indicates that individual competency for military tasks can show "marked degradation" after only 60 days, and reach upwards of 60 percent after 180 days.[296] This data is even more pronounced for collective (group) training.[297] As stated by Colonel Daniel Hampton (retired), Professor of Practice at the Africa Center for Strategic Studies, "the real metric of success is not how many personnel receive training, but rather how well a country sustains capability and maintains operational readiness."[298] While the GPOI can claim to have trained personnel numbers in the hundreds of thousands and the TPP has trained 10 troops on specialized engineering equipment, it remains unclear how many operationally ready troops exist in the present. Training programs

[296]Andrew M. Rose, Mark Y. Czarnolewski, Frances E. Gragg, Stuart H. Austin, Patrick Ford, Jack Doyle, and Joseph D. Hagman, *Acquisition and Retention of Soldiering Skills*, Technical Report 671 (Alexandria: US Army Research Institute for the Behavioral and Social Sciences, February 1985).

[297]Barbara D. Adams, Robert D.G. Webb, Harry A. Angel, and David J. Bryant, *Development and Theories of Collective and Cognitive Skill Retention*, DRDC No. CR-2003-78 (Toronto: Defence Research and Development Canada, March 31, 2003).

[298]Daniel Hampton, *Creating Sustainable Peacekeeping Capability in Africa*, Africa Security Brief No. 21 (Washington, DC: Africa Center for Strategic Studies, April 2014), 2.

should give consideration – and report – how acquired skills are being maintained over time. Follow-on refresher training, train-the-trainer programs, periodic funded field exercises, and North-South troop exchanges are some of the ways to resist skill fade.

Maximizing Ongoing Use and Maintenance of Donated Equipment

In cases where new equipment is donated to the partner nation as part of the training program, consideration must be given to whether and how this equipment will be used and maintained over time. Knowing that future potential for replacement is uncertain, expensive engineering equipment is often treated as national assets (i.e., controlled at the national level) by resource-constrained developing nations.[299] Consequently, the impacts of such donations are limited when receiving governments only sparingly employ them. When equipment is not made available to troops that need to train to maintain their skills, the concern for skill fade presented above is exacerbated. Furthermore, analysis must be conducted regarding the affordability of regular fuel needs of the equipment, as well as the sustainability of life-cycle maintenance and repair needs of the donated equipment. Consideration must be given to whether the receiving country can readily access and afford replacement parts, and how (or if) the donated equipment would be integrated into any existing heavy engineering fleets without overburdening limited support services.

Maximizing Potential for Regional Integration

[299]Major Christopher Henry, "Making a Difference Through Capacity Building in Africa" (United States Army Command and General Staff College Paper, Fort Leavenworth, Kansas, 2014), 27.

Finally, engineering capacity building can occur at the national level where many dividends of this support can be reaped. However, training and equipping of forces should be deliberately designed to maximize the prospects for successful operational integration into regional or international organizations. This is particularly true for engineering training programs in Africa, a continent where over 80 percent of UN peace operations personnel are currently deployed and where approximately 50 percent of UN troops originate.[300] As much as possible, close regional partners should have similar equipment that facilitates interoperability and ease of maintenance, as well as maintain similar techniques and procedures for equipment operation. Otherwise, unnecessary hardships and frictions can result.

CASE STUDY: CANADA AS A FUTURE ECC LEADER IN UN PEACE OPERATONS?

Canada's Departure from UN Peace Operations

Since Canada's participation in the first UN peace operation in 1956, the Canadian public has been a large supporter of national participation in these operations.[301] Canada was the single biggest TCC to UN peace operations between 1956 and 1992,[302] with contributions numbering in the thousands throughout the first half of the 1990s (e.g., between 1993 and 1995, Canada

[300]United Nations, "Troop and Police Contributors," accessed 25 March 2016. http://www.un.org/en/peacekeeping/resources/statistics/contributors.shtml; United Nations, "Peacekeeping Fact Sheet," accessed 3April 2016, http://www.un.org/en/peacekeeping/resources/statistics/factsheet.shtml.

[301]Lane Anker, "Peacekeeping and Public Opinion," *Canadian Military Journal* 6, no. 2 (Summer 2005): 23, 27; Jonathan Preece, *The Canadian Peacekeeping Narrative: Myth, Legend, and Canadian Foreign Policy Beyond Afghanistan* (Toronto: The Atlantic Council of Canada, 2010), 3; Michael K. Carroll, "Peacekeeping: Canada's Present, But Not Its Present and Future?" *International Journal* 71, no. 1 (March 2016): 167, 169.

[302]David Pugliese, "Canada's Participation in Peacekeeping Missions – Is Stephen Harper Right?," *Ottawa Citizen*, last modified 29 September 2015, http://ottawacitizen.com/news/national/defence-watch/canadas-participation-in-peacekeeping-missions-is-stephen-harper-right.

generally maintained approximately 3,000 troops on UN peace operations).[303] Until 1995, Canada had participated in all UN peace operations up to that date. Yet by 2005, Canada effectively departed the peacekeeping stage as the newly-elected Harper government embraced a new international role at the expense of peace operations participation.[304] Canada would instead focus its military power in Afghanistan, asserting its capability to participate in combat operations within the coalition prosecuting the War on Terror.[305] This departure from peacekeeping by Harper was part of his larger agenda of disengagement from the UN. Up to the present, Canada has nevertheless maintained a modest commitment of troops to the US-led Multinational Force and Observer (MFO) mission in Sinai, as it has since 1985. Presently, Canada contributes about 70 personnel to the approximately 1,700 person MFO,[306] including the current Force Commander, Major-General Denis Thompson.[307]

Indications of a Possible Return to UN Peace Operations

The election of The Right Honourable Justin Trudeau's Liberal Government on 19 October 2015 appears to herald the beginning of a return to Canada's historical participation in UN peace operations. On the same day as the Obama-led Leaders' Summit in New York, the Canadian federal party leaders were engaged in a pre-election debate in Toronto. During this debate on 28 September 2015, Trudeau commented that "right now there is a need to revitalize

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[303]United Nations, "Troop and Police Contributors Archive (1990-2014)," accessed 28 April 2014, http://www.un.org/en/peacekeeping/resources/statistics/contributors_archive.shtml.

[304]A. Walter Dorn, and Joshua Libben, *Unprepared for Peace? The Decline of Caandian Peacekeeping (and What to Do About It)*. (Ottawa: Canadian Centre for Policy Alternatives and the Rideau Institute on International Affairs, February 2016), 13; Carroll, "Peacekeeping: Canada's Present..., 168.

[305]It is important to note that while on operations in Afghanistan, Canada learned valuable lessons regarding the interconnections between security and reconstruction. See: Patrick James, *Canada and Conflict* (Don Mills: Oxford University Press, 2012), 40.

[306]Department of National Defence, "Operation Calumet," accessed on 16 March 2016, http://www.forces.gc.ca/en/operations-abroad-current/op-calumet.page.

[307]Multinational Force and Observers, "MFO Force Commander," accessed on 16 March 2016, http://mfo.org/en/biography-of-the-force-commander.

and refocus and support peacekeeping operations" and later added that "for our closest friend and allies in the US, to re-launch UN peacekeeping today and not have Canada stepping up to say yes, this is a Canadian thing that we can do well and we will support is yet another missed opportunity..."[308] Launched days later, the Liberal Party election platform[309] promised that a Liberal Government would "recommit to supporting international peace operations with the United Nations, and will make our specialized capabilities – from mobile medical teams to engineering support to aircraft that can carry supplies and personnel – available on a case-by-case basis."[310]

These declarations by Trudeau were not forgotten after his election as Prime Minister. In his mandate letter to the new Minister of Defence, The Honorable Harjit Singh Sajjan, Trudeau stated that he expected him to:[311]

> "Work with the Minister of Foreign Affairs [now Global Affairs] to renew Canada's commitment to United Nations peace operations. This includes:
>
> - making Canada's specialized capabilities – from mobile medical teams, to *engineering support*, to aircraft supplies and personnel – available on a case-by-case basis;
> - working with the Minister of Foreign Affairs to help the United Nations respond more quickly to emerging and escalating conflicts and providing well-trained personnel to international initiatives that can be quickly deployed, such as mission commanders, staff officers, and headquarters unit; and
> - leading an international effort to improve and expand the training of military and civilian personnel deployed on international operations, while insisting that any peacekeepers involved in misconduct be held accountable by their own country and the United Nations."

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[308]*Maclean's*, "Tale of the Tape: Transcript of the Munk Debate," accessed 18 March 2016, http://www.macleans.ca/politics/ottawa/tale-of-the-tape-transcript-of-the-munk-debate-on-the-refugee-crisis/.

[309]Liberal Party of Canada, "Justin Trudeau Unveils 'A New Plan for a Strong Middle Class'," accessed on 18 March 2016, https://www.liberal.ca/justin-trudeau-unveils-a-new-plan-for-a-strong-middle-class/.

[310]Liberal Party of Canada, *Real Change: A New Plan for a Strong Middle Class* (Ottawa: Liberal Party of Canada, 2015), 69.

[311]Prime Minister of Canada Justin Trudeau, *Minister of National Defence Mandate Letter* (Ottawa: Office of the Prime Minister, 2015). Emphasis added.

The Trudeau Government's interest in restoring strong Canadian support for UN peace operations is part of a broader agenda that aims at reinstating engagement with the international community – and in particular with the UN. In March 2016, Trudeau announced Canada's intention to seek a two-year seat on the UNSC beginning in 2021;[312] a month later, Trudeau was amongst the over 175 world leaders who signed the Paris Agreement (itself within the UN Framework Convention on Climate Change).[313]

Canada as an ECC: The Opportunity for Global Leadership

In April 2016, the Trudeau Government commenced a defence policy review that will solicit diverse ideas and opinions from a "blue ribbon panel" and other defence experts, Parliament, the Canadian public, and allies and partners.[314] This consultation process is set to end in July 2016. The release of a new defence white paper – Canada's first defence white paper since 1994 – will follow in early 2017.[315] Given Trudeau's already vocalized support for Canadian participation in UN peace operations, as well as the public's steadfast historical support for these operations, it's reasonable to expect these will find a prominent place in the new defence white paper. Yet, how this support will actually manifest will be an important question for both Canada and the UN. Canada need not deploy thousands of troops on UN peace operations, as it did in the 1990s, to demonstrate its firm commitment to international peace and

[312]Kathleen Harris and Melissa Kent, "Trudeau Unveils Canada's Plan to Seek 2021 UN Security Council Seat: Move Plays in to PM's Narrative that 'Canada is Back,' Expert Says," *CBC News*, last modified 16 March 2016, http://www.cbc.ca/news/politics/canada-united-nations-security-council-1.3491917.

[313]Alexander Panetta, "PM Signs Paris Accord, Now Comes the Hard Part," *CTV News*, last modified 22 April 2016, http://www.ctvnews.ca/politics/pm-signs-paris-accord-now-comes-the-hard-part-1.2870334.

[314]Department of National Defence, "Defence Policy Review," last modified 6 April 2016, http://dgpaapp.forces.gc.ca/en/defence-policy-review/index.asp; Kathleen Harris, "Harjit Singh Names Blue Ribbon Panel to Review Canada's Defence Policy," *CBC News*, last modified 6 April 2016, http://www.cbc.ca/news/politics/canada-defence-review-sajjan-1.3523414.

[315]Kathleen Harris, "Harjit Singh Names Blue Ribbon Panel to Review Canada's Defence Policy," *CBC News*, last modified 6 April 2016, http://www.cbc.ca/news/politics/canada-defence-review-sajjan-1.3523414.

security. Instead, Canada should leverage its comparative advantage in military engineering in relation to the vast majority of current prominent TCCs and provide global leadership in this operationally critical domain. In the past, Canada proved itself to be an important ECC (see XXX). There are numerous reasons why engineering should be a focus in its future commitments to UN peace operations and demonstrate it is in for the "long-haul" including

Engineering is Critical for Success on Peace Operations: Past, Present, and Future

First, as substantiated throughout this study, engineering is one of the most critical functions on UN peace operations – and one that is growing in importance. Engineering is crucial throughout all phases and tasks of UN peace operations to provide ongoing mission support, host nation assistance and capacity building, stabilization, humanitarian assistance, and development tasks. Far from simply being an enabler capability, engineering tasks are often the main effort at various times during missions. Inadequate engineering planning and capabilities are determinants of success and failure. For example, mission-failure in Libya was largely attributable to inadequate and untimely attention to infrastructure repair and development during post-conflict stabilization operations (see XXX), allowing elements of the Islamic State in Iraq and Syria (ISIS) in Libya to more easily seize power in several areas in the country.

Despite the approximately 20 separate engineering contributions being announced at the Obama-led Leader's Summit on Peacekeeping in September 2015, reasons exist why Canada as an ECC leader is essential. Many countries that provide engineering capabilities to peace operations, including several of those that made engineering commitments at the Leaders' Summit, do not possess the organic airlift capability to rapidly self-deploy to a new operational theatre when an urgent crisis emerges, a time when engineers are desperately needed to establish

camps. The ensuing setbacks associated with finding transportation into theatre delays the deployment of security forces needed to protect vulnerable populations. In contrast, Canada's CC-17 (Globemaster) and CC-130 (Hercules) aircraft permit the CAF to conduct rapid deployments when needed, vastly improving the UN's response time to emerging crises. In addition, unlike most other significant TCCs, the CAF possesses a large number of French-speaking personnel who are in particularly high demand on missions in French countries such as Mali, Haiti, Côte d'Ivoire, and the Central African Republic.[316]

The crucial need for engineering expertise on peace operations will likely become an enduring requirement for mission success well into the future. For example, during future post-conflict stabilization efforts that will be needed in Iraq and Syria, the same assessments of buildings, debris management, and coordination of public and private sectors will be desperately needed for cities such as Ramadi and Mosul when liberated from ISIS, or in Hama, Homs, Raqqa, Hama, and elsewhere that require stabilization.[317] This is particularly true for cities in Iraq's Anbar Province, where devastation is so great that international engineering expertise will be absolutely critical. While the international community failed in this regard in Libya, nations such as Canada can make preparations now so they are prepared to meet these engineering challenges.[318] Canada can also help provide the governance experts that can assist with building the capacity of national and sub-national authorities help local officials in business planning and delivering basic services.[319]

The Enduring and Highly Visible Nature of Engineering Work

[316]A. Walter Dorn, "The UN at 70: A Return of Canada, The Peacekeeper," open*opencanada.org*, accessed 29 April 2016, https://www.opencanada.org/features/un-70-return-canada-peacekeeper/.
[317]Anne Demerjian, conversation with author, 10 March 2016.
[318]Anne Demerjian, conversation with author, 10 March 2016.
[319]Anne Demerjian, conversation with author, 10 March 2016.

By virtue of the variety of tasks engineers complete, such as C-IED, road/bridge repair and construction, well digging, and facility construction on the mission, engineering troops are some of the most visible personnel to the local population. To the population of the host nation, the projects that engineers complete are the most felt and the most enduring aspects of the peace operation. Completion of such projects outside the camp leads to interactions with local people from various cultures and results in the increased cultural sensitivity of soldiers and locals alike. Furthermore, these projects have the potential to not only improve prospects for governance and economic development of the host nation well into the future, but also improve the quality of life and reduce hardships for local populations. The ongoing integration of women into the CAF, both at the officer and non-commissioned ranks, serves as an example to multinational soldiers on UN missions as well as local populations that have yet to achieve a similar level of gender equality in their societies. The particularly high visibility of engineering troops to both these groups helps maximize the example that Canada can provide in this regard.

Opportunities to Collaborate with North and South ECCs

Focusing on engineering in peace operations brings tremendous opportunities for Canada to collaborate with North and South partners. For example, Canada could bolster the scale and scope of the Triangular Partnership Project (TPP) that Japan, a prominent ECC, and the UN Department of Field Support (DFS) recently trialed for four East African Community nations in the area of heavy engineering equipment training (see XXX). Canada and Japan have long been recognized as having a similar approach to peace operations.[320] In addition to Canada assisting

[320]Alex Morrison, "Observations on Peacekeeping and Japan's Role," in *UN Peace Operations and the Role of Japan*, ed. Alex Morrison and James Kiras (Clementsport: The Canadian Peacekeeping Press, 1996), 88; Research

Japan and DFS in increasing the scale of this training, Canada could introduce additional training, such as leveraging its world-class C-IED expertise that was acquired during operations in Afghanistan. C-IED is a skill that is increasingly demanded on modern UN peace operations combating insurgencies that regularly employ the deadly IED.

Canada could also engage in bilateral cooperation with South nations, including with the peace operations training centres present in many nations, for building engineering capacity. For example, it could create a long-term partnership with a country such as Ghana, currently the seventh largest UN TCC and a credible African leader in UN and ECOWAS peace operations participation that lacks the resources to fully develop engineering capabilities (see XXX). Related past Canadian support to Ghana includes providing funding with numerous other nations in the early-2000s toward constructing the Kofi Annan International Peacekeeping Training Centre located in Accra.[321] Ghana has been praised by the UN for its integration of women into forward forces on peace operations. In 2009, Peter Dnistrianskyj, leader of a delegation from the Canadian Joint Programmes of Africa and Peace Support Operations, called Ghana a "pioneer and a role model in the area of peacekeeping."[322] Ghana's enthusiasm as an ECC in particular has not only been demonstrated on peace operations, but it was also one of only two African nations – the other being South Africa – to provide representation for the recent development of the UNMUM-Engineers.[323]

Institute for Peace and Security, *The 4th Canada-Japan Symposium on Peace and Security Cooperation* (Tokyo: Research Institute for Peace and Security, 2005), 13.

[321]IHS Jane's, *World Armies*, Issue 36 (Surrey: IHS Jane's, 2014), 299. Other nations that provided construction funding included the other G7 countries of United Kingdom, Germany, Italy, France, Japan, and the US.

[322]Ibid., 297-298. Internet searches attempting to find any information regarding the "Canadian Joint Programmes of Africa and Peace Support Operations" have had no success. The entry is presumed to have intended to read the "Lester B. Pearson Canadian International Peacekeeping Centre" as Mr. Dnistrianskyj was working with this institution in 2009.

[323]Japan. Ministry of Defense. "United Nations Military Manual for Engineers (UNMUM-Engineers)," accessed 19 April 2016, http://www.mod.go.jp/e/d_act/kokusai_heiwa/engn_manual/.

An additional partnership opportunity that would increase engineering capabilities of developing nations is to conduct a joint deployment within a North-South model. Joint deployments usually happen as North-North (e.g., XXXX on page XXX, as well as between Canada and Japan for approximately 20 years on the United Nations Disengagement Observer Force (UNDOF) in the Middle East[324]) or South-South (e.g., XXXX on page XXX).[325] Few examples of North-South joint deployments for UN peace operations exist (e.g., the Norway-Serbia Level 2 hospital in Chad). However, there may be no examples of a North-South joint operation established that have been completed with an African country or that have created an engineering organization.[326] Such a North-South joint deployment can reinforce both the relationships and the skills as established with South ECC partners during training programs, such as the TPP. More than simply providing training and equipment, training programs can serve as a precursor to operating in tandem on a joint deployment.

Bringing More Sustainable Engineering Technologies to UN Peace Operations

The Trudeau government has indicated its commitment to environmentally sustainable policies, and their intent to increasing funding and research to sustainable development technologies.[327] As the UN grapples with reducing its logistical burden (e.g., fuel and water demands) and environmental footprint on peace operations, Canada's participation as an ECC creates enormous potential to bear Canadian innovations and technologies on these missions and to achieve sustainable engineering objectives as well as reducing operational costs. For example, Canada has developed expertise in the area of sustainable engineering solutions to reduce

[324]A. Walter Dorn, notes provided to author, 30 April 2016.
[325]Arthur Boutellis, telephone conversation with author, 22 March 2016.
[326]Arthur Boutellis, telephone conversation with author, 22 March 2016.
[327]Liberal Party of Canada, *Real Change*..., 6, 8.

deployed camp dependency on fossil fuels, in hot and cold environments, with the usage of equipment such as variable speed generators, incinerators, water and wastewater treatment units, and collecting and analyzing energy consumption data to guide further measures.[328] Sustainable engineering, as part of a larger concept of sustainable development, also provides significant opportunities for Canadian academic, private, and civil society organizations to play a large role in enhancing operations and partnerships with developing countries.[329] In addition to providing tangible benefits to peace operations, sustainable engineering technologies would be another clear demonstration to the world of the Trudeau Government's commitment to reduce climate change and other environmental impacts.

Sustainable engineering technologies are also yet another way that Canada can foster North-North and North-South collaboration in the engineering domain. Collaborative and innovative solutions to pressing operational problems can be shared and advanced amongst ECCs. Technologies can be demonstrated and possibly employed in developing nations in the future, with assistance provided in procurement processes for these technologies if needed.

Areas of Concern as Canada Returns to Peace Operations

In order to professionally reengage in UN peace operations as an ECC, Canada will need to effectively address a number of general and technical issues. Canada will have to reinvigorate and update its peace operations training and doctrine, further develop engineering capabilities, and address the more general problem of military personnel pessimism about peace operations.

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[328]Major Lloyd Chubbs, "Canadian Case Studies on Energy Efficiency During Operations," in *Energy Security: Operational Highlights*, No. 6 (Vilnius: NATO Energy Security Centre of Excellence, 2014), 9-14; Suzanne Cassolato, Major Lloyd Chubbs, Ed Andrukaitis, Vivier Lefebvre, Martin Kegel, "Operational Energy: A Multi-Faceted Government Approach," *Energy Security: Operational Highlights*, No. 7 (Vilnius: NATO Energy Security Centre of Excellence, 2014), 14-18.

[329]Margaret Biggs, John W. McArthur, Kate Higgins, David Moloney, Julia Sanchez, and Eric Werker, *Towards 2030: Building Canada's Engagement with Global Sustainable Development* (Ottawa, Centre for International Policy Studies, November 2015).

Peace Operations Training and Doctrine

Over the last decade, the CAF has reduced its peace operations training to less than a quarter of the activities formerly conducted.[330] Furthermore, despite the advancement of the UN's operational complexity, techniques, procedures, and doctrine in the last decade, the CAF doctrine manual for guiding Canadian participation in peace operations has not been updated since 2002.[331] These facts may present difficulties for Canada's reengagement in peace operations given its effective absence since 2005. The void of training and doctrine for these operations cannot even be partly filled by recent experience on these peace operations. It is true that much of Canada's extensive multidimensional operational experience in Afghanistan can be transitioned to good use on peace operations – including C-IED expertise and civilian infrastructure reconstruction, amongst the numerous other combat and general support engineering tasks that were performed. However, participation on peace operations requires specialized training and doctrine. This fact was supported by the Commission of Inquiry to the Deployment of the Canadian Forces to Somalia in 1997 – almost twenty years ago – who found that the absence of specific doctrine and training for conducting peace operations was a significant contributing factor leading to the murder of a Somali youth at the hands of CAF soldiers.[332] In the Commission's opinion, comprehensive peace operations doctrine and training

[330]A. Walter Dorn, and Joshua Libben, *Unprepared for Peace? The Decline of Canadian Peacekeeping (and What to Do About It)*. (Ottawa: Canadian Centre for Policy Alternatives and the Rideau Institute on International Affairs, February 2016), 6.

[331]Ibid., 13.

[332]Commission of Inquiry into the Deployment of the Canadian Forces to Somalia, *Dishonoured Legacy: Lessons of the Somalia Affair, Report to the Commission of Inquiry into the Deployment of the Canadian Forces to Somalia* (Ottawa: Minister of Public Works and Government Services Canada, 1997), ES-31.

based on the changing "diverse and complex challenges" of these operations were needed, yet were absent within the CAF.[333]

In addition to updating its peace operations doctrine, the CAF should consider doing the same for its engineering doctrine. The current volume describing the "policies and concepts for engineer operations in a theatre of operations," *Land Force Engineering Operations – Volume 1*, was published almost twenty years ago in April 1998 and it contains only two unsubstantial references to peace operations.[334] In contrast, the corresponding US publication, *Joint Publication 3-34 Joint Engineer Operations*, has been revised and reissued twice (2000, 2016)[335] since 1998. Furthermore, the latest version (206 pages) was substantially expanded from the previous edition (93 pages), and includes numerous references, and a pair of discussions, on the use of engineering on peace operations.

New Engineering Capabilities

Taking on a leadership role as an ECC will require the CAF to acquire new capabilities, each with an associated Occupational Specialty Specification (OSS) for officer and non-commissioned members who will develop these expertises. Well drilling is a capability that the CAF does not currently possess, but is often in demand on peace operations for support to the mission and local populations. The CAF currently only possesses rudimentary capabilities for conducting the type of infrastructure assessments that were needed in Libya, and that will be needed in Syria and Iraq when liberated from ISIS. Accordingly, if the Canadian government would like the CAF to achieve this capability, training frameworks will need to be established.

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[333]Ibid., ES-31.

[334]Department of National Defence, B-GL-361-001/FP-001..., 83, 130.

[335]United States, Joint Chiefs of Staff, Engineer Doctrine for Joint Operations (Washington, DC: Joint Chiefs of Staff, July 5, 2000); Joint Chiefs of Staff, Joint Publication 3-34, *Joint Engineer Operations* (Washington, DC: Joint Chiefs of Staff, January 6, 2016).

Each officer OSS, for example, would likely require a master's degree in civil engineering. The CAF would only have the capacity to develop a small cadre for this specialized function, and targeted recruitment of structural assessment specialists into engineer reserve units may be a method of bolstering this capacity. Moreover, Canada could encourage other ECCs to develop this capability to create multinational units for this function. Leveraging private as well as military engineering expertise will be needed in large operational theatres, such as Iraq and Syria, due to the scope and scale of infrastructure assessments that will be needed. It will therefore be necessary to build partnerships with private firms to ensure sufficient surge capacity when needed.

Addressing Pessimism within the CAF Regarding UN Peace Operations

If Canada is to reengage in UN peace operations, persistent pessimism within the CAF regarding these operations should be addressed. This pessimism largely stems from experiences of Somalia, Bosnia, and Rwanda in the 1990s – missions for which Canada provided large contributions, but proved to be tragic failures for the UN with weak rules of engagement (ROE) for completing assigned tasks that included protecting vulnerable populations.[336] Newer generations of soldiers not yet in the CAF when these missions were conducted have inherited the pessimism of their seniors. Within the 2009 memoir of highly influential Canadian General (retired) Rick Hillier, *A Soldier First: Bullets, Bureaucrats and the Politics of War*, he excoriated the UN by stating "the United Nations itself couldn't run a one-man rush to the outhouse.

[336]David Pugliese, "Canada's Participation in Peacekeeping Missions – Is Stephen Harper Right?" *Ottawa Citizen*, last modified 29 September 2015, http://ottawacitizen.com/news/national/defence-watch/canadas-participation-in-peacekeeping-missions-is-stephen-harper-right; Martin Fischer and Maria Derks Normandin, "Peacekeeper Contributor Profile: Canada," *Providing for Peacekeeping*, last modified January 2013, http://www.providingforpeacekeeping.org/2014/04/03/contributor-profile-canada-2/.

Pragmatically, it was almost criminal to put Canadian troops under UN command … because the UN was fundamentally incapable of running effective military operations."[337]

However, this pessimism has largely endured within the CAF due to "a lack of awareness about the reforms that the UN is undertaking and how UN peacekeeping has changed on the ground."[338] CAF personnel need to be educated regarding the much more robust ROEs that exist on modern peace operations, the critical reliance that vulnerable populations have on the resolve of UN and its Member Nations, as well as evidence that the establishment of peace operations reduces the likelihood of subsequent conflict by 75-85 percent in comparison with areas for which peace operations are not established.[339]

CONCLUSIONS

APPENDIX 2: REFLECTIONS OF A FORMER FORCE ENGINEER

This section is a summary of information obtained through a discussion with David Harries on 20 February 2016. He served as a Field Engineer Officer for 30 years in the Canadian Armed Forces (CAF) and was appointed to several senior roles including being deployed as the UNPROFOR Force Engineer for 12 months in 1992-1993. Amongst his extensive qualifications, he holds a PhD in Nuclear Engineering from the University of London and has completed military courses at the Canadian Army Staff College and the Armed Forces Staff College of the United States, and taught at the Canadian Forces Command and Staff College (1977-81), and the National Defence College of Canada (1985-1990). On leaving the CAF, he moved to Asia where he held several positions as a consultant in personal and corporate security, and as a senior advisor and professor in heavy engineering, humanitarian aid, executive development, and post-conflict/post-disaster response and recovery. On return to Canada in 2002, at the Royal Military College of Canada (RMCC), he developed curriculum, lectured and was Executive Director of the Master of Arts Programme in Security and Defence Management and Policy. Currently based in Kingston, Canada, he continues research, curriculum development, teaching and facilitation of strategic foresight, and is the current Chair of Canadian Pugwash.

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[337]General Rick Hillier, *A Soldier First: Bullets, Bureaucrats and the Politics of War* (Toronto: HarperCollins Publishers Limited, 2009), 152.

[338]Martin Fischer and Maria Derks Normandin, "Peacekeeper Contributor Profile: Canada," *Providing for Peacekeeping*, last modified January 2013, http://www.providingforpeacekeeping.org/2014/04/03/contributor-profile-canada-2/.

[339]Koops *et al*, "Introduction..., 6.

> "There is no military capability with greater opportunities or more broadly capable of making important contributions than engineers when on UN peace operations. Engineers are required to have an understanding of a multitude of skills including civil, military, political, mitigation, and development engineering. I've never seen a terms of reference or job description for engineers on a peace operation that includes all of these items. But all of them apply."
>
> "All soldiers stand to gain and learn from UN peace operations deployments. This is particularly true for engineers who have the knowledge and skills to complete *field* engineering projects while on a mission that can greatly and directly improve conditions for threatened and vulnerable local populations."
>
> "Engineers are always in demand and there will never be enough of them, neither soon enough or with sufficient resources. How engineers handle the context of their UN peace operations can be as important as what they accomplish."
>
> "Military engineers and civilian engineers have often done great work on missions. But equally often, the system to ensure the survivability of what they had accomplished over time was not in place. Engineering projects are not fully successful simply because they are completed. They are most successful only if they endure."
>
> "In terms of ensuring international peace and security, the UN has much room for improvement. However, it is doing better than any other organization globally."

The following represents more detailed information from the discussion, during which he shared specific cases from her experiences:

Every nation that participates in UN peace operation are helped or hurt by the engineering capabilities on that mission. On any mission, the more senior an engineer is, the higher the requirement for this engineer to educate non-engineers on engineer roles, capabilities, priorities, limitations, as well as opportunities to enhance engineering contributions. Much of Colonel Harries' role as Force Engineer for UNPROFOR was "a political engineering role," – as he refers to it – which included educating both military and UN HQ leadership about the role of engineering. This function was required each time leadership changed. Colonel Harries observed that during the mission and depending on changing priorities, whether there had been recent

engineering successes or there have been recent events that underscored the necessity for engineering requirements, recognition and support for procurement of engineering needs experienced ebbed and flowed.

One of the great challenges of peace operations engineering is an inherent discrepancy between need for specific, well-defined processes and methods, and the resources to accomplish them. The operational context is often such that these details are extremely difficult to obtain. In this context, social science training becomes just as important as formal engineering training. Furthermore, although engineers are in the business of peacebuilding, often what is happening around them is anything but peaceful. Even relatively junior engineers must make important decisions. Therefore, to be effective, all engineers must be very confident people.

UNPROFOR was the first major UN peace operation with tens of thousands of troops deployed, and the first mission that took place in a country with a horrendous winter. Prior to this mission, almost all UN peace operations occurred in warm climates where roads were not blocked by snow and where troops were did not freeze to death when inadequately accommodated. Troops deployed to UNPROFOR from warm locations, such as Kenya and Malaysia, had no experience in coping with winter conditions and could not work efficiently – even with assistance. This constraint became a source of great stress for these contingents and for those who, not infrequently, had to ‘fill in’.

Shortly after Colonel Harries was deployed on the UNPROFOR mission, the Indian Force Commander, Lieutenant-General Satish Nambiar, ordered him to travel to UN HQ in New York. There, he was to relay that the troop accommodation shelters used by UN troops in Cypress, the Sinai, and the Golan Heights were completely inadequate for the winter conditions present in the former Yugoslavia, particularly in the mountain pass regions where a metre of

snowfall could accumulate in a very short period of time. He found that some UN HQ staff did not understand or have knowledge of these basic realities of weather in the former Yugoslavia, in part because many of them came from countries with no winter. He found some staff to be outright resistant to changing funding plans in order to cope with these challenges. As a result, improvisation became very important. For example, a deserted metal kitchenware factory near Zagreb was used to manufacture snow shovels that were used to help clear the snow.

Each TCC was to come to the mission with integral engineering capabilities for their basic national needs. Each possessed engineering capabilities in highly varying degrees. Some came with no capabilities at all, as their national leadership had ignored or misunderstood UN direction for contingent preparedness. Each nation that provides engineers has different skills and technological competencies and there is often little common ground between them. Some nations can have rough methods and yet perform well. How hard nations try and which methods are used to accomplish their mission is sometimes questionable. What they consider more or less legal also depends on their national culture. On UN peace operations, less developed nations are given the opportunity to reap knowledge and experience from more developed nations. This comes as a great benefit to them as the mission serves as a "school of the world." Several hundreds of UNPROFOR soldiers from less developed nations gained technical, civil, and military engineering knowledge from nations such as Canada – knowledge they did not possess upon arrival but took back to their nations when they were replaced. This knowledge, even in matters as elementary as ground preparation, clearing operations, and accommodation maintenance would potentially be put to good use once returned to their respective home nations.

Participation of female engineers is always a benefit to the mission. Women are able to go into communities and communicate most effectively with local women on different matters

(e.g., mine awareness, water supply, etc.). When Colonel Harries first arrived in the former Yugoslavia, the main UNPROFOR engineering contingent was Canadian, based in Croatia. One of the primary tasks was minefield marking and occasionally clearance operations. However, in the former Yugoslavia, where women soldiers were not always accorded the same respect as men, Canadian female engineers responsible for mine clearance in the countryside required protection from local men. Female Canadian engineers – often from the reserve force – were as good or better in mine identification and clearance as their men counterparts.

Engineering costs during big missions can be enormous, by design and by default. For example, the mission spent vast amounts of funds transporting resources, such as gravel from Germany (much of the local gravel in the former Yugoslavia was not considered suitable for construction purposes). A sizable portion of this gravel "disappeared" during the course of the mission because as a scarce resource it was extremely valuable. Another problem during the mission was that valuable equipment – not only engineering equipment – disappeared with "alarming regularity." the unfortunate consequence of these occurrences was that contingents with modern equipment were often reluctant to loan it to those without.

One of Colonel Harries' great experiences during the tour concerned the Slovak engineering contingent. Slovakia became a nation in February 1993, and throughout the subsequent months, Colonel Harries travelled to Bratislava, the capital of the Slovakia, and other bases to help the nation form a heavy engineering contingent to be assigned to UNPROFOR. The Slovak government wanted to quickly join the international community after spending decades in the Soviet bloc. By the end of June 1993, their engineering troops arrived in Croatia, meeting the middle-tier criteria after only months of being an independent state. The Slovakians accepted the help that was offered, acknowledged, and even expanded upon the recommendations made,

including some that required difficult and significant changes to the national military culture, doctrine, and resource structures.

When the Warsaw Pact dissolved, Slovakia was fortunately the location where enormous amounts of its engineering and non-engineering equipment were held.[340] When the Canadian contingent of engineers was not replaced, the Slovak engineers were able to fill a critical engineering gap for the mission. They had very little English but very strong character. Most impressively, the novice Slovaks had the courage and honesty to admit and deal with their weaknesses and their errors as they arose. The contingent consisted of approximately 800 troops, including numerous women some in leadership positions. The equipment available to them was significant and ranged from bulldozers to trench diggers to mine clearing tanks with rollers and ploughs. The Slovak engineering contingent was extremely enthusiastic to perform well, and to this day, Colonel Harries describes the Slovak contingent on UNPROFOR as a model of hard work and commitment to the mission. This first-ever Slovak UN contingent performed well beyond expectations from the start.

During UNPROFOR, engineering contingents were encouraged to at least engage, and if possible hire locals and provide employment opportunities. In Colonel Harries' opinion, unless operationally impossible, locals and particularly young people should be given the opportunity to contribute and participate in engineering projects taking place in their community. They should be given a role to invest in a better future for their community and to participate in projects that will endure and provide long-term benefits. Their participation in these projects have the added benefit of equipping them with the skills to sustain the projects started by the UN over time – if

[340]In addition, during the Cold War, one of their specializations was pontoon bridge-laying, which they demonstrated with amazing skill. (A. Walter Dorn, notes provided to author on 30 April 2016, based on a communication between Dr. Harries and himself during the teaching of the course "Live, Move, and Work: Engineering in Modern Peacekeeping," Lester B. Pearson Canadian International Peacekeeping Centre, Conwallis, Nova Scotia, September 2001).

circumstances permitted – and to conduct similar projects in the future should the resources become available (e.g., from the UN). The Slovak contingent was particularly good at involving civilians, in part because many of them could speak the language of many locals. Furthermore, the wages necessary to employ locals are typically not a significant cost to nations such as Canada and other nations, whose engineering contingent, when in theatre, had funds for that very purpose. Active, performing, and constructive locals are beneficial to the mission, whereas idle populations are often linked to negative consequences.

Nevertheless, when an external organization goes into an area for purposes of rebuilding and assisting the population, and where large sums of physical and financial resources are involved – such as is the case with engineering operations – corrupt and criminal elements will try to exploit it. There are different approaches to dealing with this issue. In order to try to minimize problems, operational leaders can intentionally and openly offer all potential players a part of the action. Alternatively, operational leaders can try to eliminate all corrupt and criminal participation. But that position can create other problems. Providing everyone with opportunities to participate can overall pay greater dividends than excluding some parties. Of course, every effort needs to be taken to prevent clear criminal elements from obstructing progress in any way.

During his deployment UNPROFOR, Colonel Harries had to collaborate with NGOs. During the mission, the Finnish construction battalion had access to a large hall near its Zagreb airport base. Once a month, he invited representation from military, civilian, and NGOs and other organizations with engineers or significant engineering interests throughout the former Yugoslavia to attend a "tactical luncheon." Attendance would always be dependent on ease of travel at the time. Sometimes the number of attendees reached over 100. Everyone was provided with a few minutes to share the nature, circumstances, challenges, and lessons learned from their

engineering work, and to ask questions. One of the most important aspects of this controlled coordination forum was that it allowed for open and honest dissemination of information about failures that had occurred, and it allowed others to avoid or prevent similar failures. The forum deliberately encouraged attendees to be very forthright about the good and the bad of their operations. The forum was of such utility that many would spend significant time and money to attend; Macedonians would fly to Zagreb through Italy. It was important because lives and progress were at stake.

Colonel Harries expressed concerns that peace operations have evolved to where the vast majority of TCCs are less developed nations who do not possess many modern engineering tools, let alone the most advanced technologies to best accomplish the missions. However, he emphasizes that having these less developed nations on UN peace operations is not all negative. Troops from these nations learn much about operations while participating.[341] However, the question is whether the future of UN peace operations can be guided and managed in a way that all development levels can benefit. Is the UN up to this challenge?

APPENDIX 3: FEMALE ENGINEERS FOR MINE AWARENESS

Lieutenant-Colonel (Retired) Sylvie Lemieux discussed her first-hand knowledge of Operation Salam, during which she held the rank of Captain, with the author and thus served as a primary source of information for this section. She served as an Army Engineering Officer in the Canadian Armed Forces (CAF) for 20 years, and was the first female to hold such positions as Base Construction Engineering Officer and Aide-de-Camp for the Chief of the Defence Staff. She retired from the CAF in 1999 and subsequently entered the Canadian federal public service and served as an executive officer until 2005. She has worked a consultant in project and programme management at the local, national, and international level. Presently, she is a consultant for Global Affairs Canada and is pursuing a PhD in Conflict Studies at Saint-Paul University in Ottawa.

[341]In addition, sometimes less developed nations are better able to build for the local communities where less sophisticated technology can be better maintained locally in the future. (A. Walter Dorn, notes provided to author, 30 April 2016).

During the Soviet occupation of Afghanistan, an estimated six million Afghans fled their homes for Pakistan, and another three million fled into Iran. The displaced Afghan in Pakistan were mainly gathered around Peshawar in the north and Quetta in the central-west, and languished in large tented refugee camps until it was safe to return to their homes.[342] Following the Soviet withdrawal, the UN initiated a humanitarian and economic assistance mission in 1988, Operation Salam, to assist in the return of the Afghans refugees and the rehabilitation of their nation.[343] Mines, predominantly laid by the Soviets (but also by the Mujahedeen) – mostly anti-personnel – had reduced the Afghan land available for cultivation by approximately 40 percent.[344] Operation Salam included numerous initiatives such as mine awareness training as well as agricultural and health programs.[345] The mission was officially considered a humanitarian mission and was not established through UNSC approval. As a result, the troops to be deployed on the mission were considered "Experts on Mission" (a term used on peace operations as well) and would not retain the same benefits or diplomatic privileges granted on UNSC-approved UN peace operations. Military personnel deployed in support of Operation Salam were unarmed and not permitted to wear national military uniforms.[346]

In October 1988, the UN appealed to member nations to provide resources for basic mine clearance training for Afghans. They would then conduct mine clearance within their home villages upon their return to Afghanistan. Only two countries provided funding for the program,

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[342]Ian Mansfield, *Stepping into a Minefield: A Life Dedicated to Landmine Clearance Around the World* (Newport: Big Sky Publishing, 2016), Chapter 2.

[343]Prince Sadruddin Aga Khan, "'Operation Salam': To Build a Future," *UN Chronicle* 27, no. 2 (June 1990): 22.

[344]Canada, Department of National Defence, "Details/Information for Canadian Forces (CF) Operation Decimal," accessed 21 January 2016, http://www.cmp-cpm.forces.gc.ca/dhh-dhp/od-bdo/asia/DECIMAL-eng.asp.

[345]Khan, "'Operation Salam'…, 22.

[346]Mansfield, *Stepping into a Minefield*..., Chapter 2.

and a limited number of nations, including Canada, provided trainers.[347] Operation Decimal, Canada's support to Operation Salam, ran from June 1988 to August 1990 and included four separate rotations of twelve engineering personnel deployed to the Peshawar area.[348] By the end of Operation Decimal, approximately 20,000 Afghans had been trained by the nations providing mine training,[349] for which Canada had provided an important contribution.

The UN and Afghan government specifically requested female engineering officers from Canada as it was the only nation capable of providing female trainers.[350] Three female officers were provided by Canada during each rotation of Operation Decimal.[351] Captain Sylvie Lemieux was among the Canadian female engineering officers deployed on the final rotation, and was the Second-in-Command of the Canadian contingent. Like the previous three rotations, and while the Canadian male engineering officers and non-commissioned personnel worked with Pakistan Army engineers to teach Afghan men to dispose of mines using explosives, the task of two of the Canadian female engineering officers was to provide mine awareness training to women and children in the refugee camps, schools, clinics, while the third Canadian female engineering officer worked within the mission headquarters.[352] Within the Afghan patriarchal society, it was unacceptable for foreign men to train the women; rather, they were responsible for caring for the children.[353] The training to Afghan women and children was important as they had principal responsibility for gathering wood, clearing fields, and were therefore often the first to encounter

[347]Mansfield, *Stepping into a Minefield...*, Chapter 2. The reference did not contain information regarding which two countries provided funding for the training. Additional efforts to obtain this information were unsuccessful.

[348]Department of National Defence, "Details/Information for Canadian Forces (CF) Operation Decimal," accessed 21 January 2016, http://www.cmp-cpm.forces.gc.ca/dhh-dhp/od-bdo/asia/DECIMAL-eng.asp.

[349]Khan, "'Operation Salam'…, 22.

[350]Lieutenant-Colonel Sylvie Lemieux (Retired), telephone conversation with author, 19 January 2016.

[351]Department of National Defence, "Details/Information for Canadian Forces (CF) Operation Decimal," accessed 21 January 2016, http://www.cmp-cpm.forces.gc.ca/dhh-dhp/od-bdo/asia/DECIMAL-eng.asp.

[352]Department of National Defence, "Details/Information for Canadian Forces (CF) Operation Decimal," accessed 21 January 2016, http://www.cmp-cpm.forces.gc.ca/dhh-dhp/od-bdo/asia/DECIMAL-eng.asp.

[353]Lieutenant-Colonel Sylvie Lemieux (Retired), telephone conversation with author, 19 January 2016.

mines in these locations, and they were therefore highly vulnerable. Furthermore, a woman handicapped by a mine blast or any other devastating event had a low chance of survival as the family would typically not care for them.[354] The women and children were taught to recognize likely areas for mines, and when mines were discovered, they were trained to mark the location and report it.[355] During Captain Lemieux's rotation, a "Master Teacher" program was initiated whereby educated Afghan women were taught to be teachers in Pakistan and later in Afghanistan. This program existed in Peshawar and Quetta, and trained scores of Master Teachers.[356]

The female engineering officers, such as Captain Lemieux, were required to overcome cultural barriers to maximize the effectiveness of the training. For example, Afghan women were conditioned not to ask questions, therefore the female military trainers had to exercise care to thoroughly explain concepts and think of questions that the Afghan women might be reluctant to ask. With no military personnel being permitted to wear national military uniforms, similar to the men, the Canadian female officers wore *shalwar kameez* with the additional measure of wearing a scarf or veil to cover their head.[357] Due to their officer status, however, the Canadian female engineering officers were generally treated by locals as though they were men.[358] Recently reflecting on her experiences on the mission and her military service in general, Lieutenant-Colonel Lemieux (Retired) stated that:

> Military engineers and Canada should be proud of their contributions to humanitarian missions at home and abroad. These missions require different skill sets than those usually thought of military personnel. They are based on mutual

[354]Ibid.
[355]Ibid.
[356]Ibid.
[357]Ibid.
[358]Ibid.

> and equal respect where we are those fortunate to provide for the well-being of our humanity.[359]

APPENDIX 4: INFRASTRUCTURE ENGINEERING IN FRAGILE AND FAILING STATES

This section is a summary of information obtained through a discussion with Anne Demirjian on 10 March 2016. Ms. Demirjian served as the Director of the Political Affairs and Mediation Group at the UN Mission in Somalia (UNSOM) in 2014-2015, responsible for peace-building, state formation, political dialogue and local reconciliation. From 2004-2013, she headed the UNDP's Democratic Governance portfolio in the Middle East and Eastern European countries. At UNDP – Iraq, Libya, and Somalia – she was responsible for constitutional review, rule of law, local governance, human rights, and civil society development programmes, among other things. Ms. Demirjian also has 20 years of senior management experience with the Federal Government of Canada, working in such places as Central Asia, Haiti, Jordan, Egypt, Tunisia, Palestine, Zimbabwe, South Africa, and Nigeria.

> "With Canada's withdrawal from the international community over the last ten years, we have really done ourselves and the international community a disservice. I know the talent we have at home amongst the military and public servants, and I would sit down at the UN as the Director of Political Affairs in Somalia disappointed with our lack of participation in multilateral decision-making and programming at the United Nations. On the Canadian diplomatic side, I have observed a change in the tone, style, and approach with the new government. What will Canada's new role in multilateralism be? There will definitely be a learning curve for current senior officials who during the last ten years of their careers were not permitted at the table during high-level multilateral meetings, and are not used to meeting with foreign dignitaries and sharing ideas. I am informed that of all the federal departments, the most alienated was likely DFATD [now Global Affairs]."

> "The new Liberal government is revisiting our international engagement strategy in conflict countries. There are some very concrete and tangible areas where I think Canada can provide desperately needed expertise. One such area is the Canadian operational military capabilities and their capacity to provide crucial assistance at the military-civilian interface for stabilization efforts in the infrastructure domain, along with disarmament, demobilization and reintegration (DDR). This is absolutely important for the success of the UN missions both in conflict/post-conflict stages and it is an area where I believe Canada can provide

[359] Ibid.

> immediate and critical support, and there are few other nations capable of providing this function."

The text below represents more detailed information from the discussion, during which she shared specific cases from her experiences in Somalia, Libya, and Haiti:

Somalia

Somalia is a federation of several territories and the Somali society is structured around clans. The fall of Siad Barre's regime in 1991 was followed by a civil war and the rise of violent extremism. Since then, there has been virtually no national or sub-national governments or institutions. As such, it is sometimes referred to as "the ultimate poster child of failed states."[360] In the territories of Somaliland and Puntland, there was always some semblance of a government, but nowhere else. In the south, for example, there has been no government for the last twenty years.

With none of the institutions of government, Somalia has almost no infrastructure. In general, the road conditions across Somalia are deplorable. To complete its mandate, the UN therefore has a high reliance on developed nations to provide aviation assets that allow critical mobility capabilities across even very short distances. During the process of creating federal states within Somalia in 2013 to the present, whether travelling to Kismayo in the south or Baidoa, Belletwayne, or Dhusamareb in the north, it is always necessary to fly, as there are no roads. While the UN can draw on aviation resources (e.g., planes and helicopters) from developed member states, Somalia itself has no aviation assets and is therefore significantly restricted in its capacity to govern the nation except when other nations provide access to these assets. Within Mogadishu, likely less than 50 percent of the roads are trafficable and outside the capital, approximately 95 percent of the roads are not trafficable for most vehicles except large

[360]Ms. Demirjian provided no specific reference for where this saying originated.

civilian or military vehicles. Even the one-hour drive between Mogadishu and the town of Merka, roads are virtually non-existent, and where they do exist, conditions are treacherous. This creates significant problems when conducting military operations, providing humanitarian assistance, and development support. Sadly, UN was often unable to distribute humanitarian assistance because there was no way to reach the locations where it was needed. Capacity to improve the road network has been hindered by a combination of security, funding, and technical expertise deficiencies. Al Shabaab, the extremist Islamic group that once had control over large parts of Somalia, still holds on to a significant area of land.

The present priorities of the UNSOM and AMISOM, the AU mission present in Somalia are to push out Al-Shabaab, create stability, federate the remaining states, train Somali security personnel, prepare for the elections later in 2016, and assist in finalizing the draft constitution. These efforts are to legitimize the national and sub-national governments. The AMISOM and Somali military have jointly had successes in clearing Al-Shabaab from key towns such as Mogadishu, Kismayo and other areas. However, one area that Somali and international efforts have dismally failed is in the stabilization of liberated areas where the military/civilian interface at local and sub-national is crucial. To maintain the peace after clearing militants, interfacing with the locals is required to assess the infrastructure (roads, schools, hospitals, market places, water, sewage disposal, etc) in highest need of repair, and subsequently create a functioning system. However, none of these technical engineering assessment capacities exist in the Somali government, AU, or UN organizations in Somalia. This gap seriously undermines the credibility of these organizations within the newly liberated areas, thereby significantly impairing the potential for long-term peace in these locations. The first 60 days is critical for gaining credibility, and infrastructure assessment efforts with local assistance are a part of the early goals

that need to commence in this initial period. Sometimes, it may just require one individual with the right combination of communication skills, operational skills, and technical engineering assessment expertise to set these efforts on the right path at the local level.

Roads are critical to national unity, conduct of elections, increasing economic activity, and ensuring ongoing security. There were ambitions to make the 2016 election a one-person one-vote system, but security concerns (mostly the presence of Al-Shabaab in many areas) and the poor road network throughout the nation has made this impossible. In 2008/2009, when Ms. Demirjian helped launch the constitutional drafting process, approximately 25 Somalis were nominated to consult with clan elders, religious leaders, and locals in various constituencies to discuss the process and collect feedback. None of them were able to even proceed on their task because it was physically impossible due to the inadequate road network. In 2015-2016, the situation has slightly improved because transportation provided by UNSOM is helping officials travel to key towns for national consultations.

Conversely, within Iraq in 2005, road infrastructure existed to a certain extent. But in some areas, such as Kurdistan, there were insufficient roads to evenly distribute election ballots. In some areas, ballot boxes needed to be carried by trucks from large cities, loaded into cars as the road network degraded farther outside the city, and in some mountainous areas, ballot boxes were even loaded onto donkeys to reach locations with no road access.

Somalia is perhaps the mission where the best collaboration between the UN and AU has occurred. This is partially because the AMISOM is being strongly supported by the UN, US, EU and other countries. The fight against Al-Shabaab is an important part of the US anti-terrorism policy. The US has played a pivotal role in Somalia, including advising, training, and donating equipment – some of which were donated from their operations in Afghanistan. Initially the

UNSOM and AMISOM missions were separate, but in 2014 it was brought together under the auspices of the SRSG of the UN. However, in practice, the mission jointly operates as equals.

The AMISOM and UNSOM greatly desired a training mission to be provided by a single nation for Somali soldiers,[361] but there was no agreement as to which nation would lead it. The US was seen by most to be very satisfactory, but they had no appetite for leading it. Although the British were willing, the past British-Somali colonial relationship made such an arrangement unsatisfactory to the Somalis. There was a great opportunity for a nation like Canada, who would have been acceptable to all parties, to step in and lead the training mission. This did not occur.

Canada does not have an embassy in Somalia but the High Commissioner of Canada in Kenya serves both countries. In the past, communications between UNSOM and the Canadian High Commission was limited due to the High Commissioner's absence from Somalia. Since the election of the Liberal government, however, the High Commissioner has engaged with UNSOM, much to the relief of the SRSG at the time. Mr. Nicholas Kay frequently commented that the Canadians were the best at stabilization, especially in disarmament, demobilization, and reintegration (DDR), and their assistance within UNSOM is highly desired. Mr. Kay was also impressed with Canada's highly successful efforts of the Provincial Reconstruction Team (PRT) in Kandahar Province while he led the British PRT efforts in Helmand Province.

Libya

In 2012, the international community went into Libya and Canada led the mission that helped overthrow Muammar Gaddafi. Ms. Demirjian first went to the country in November 2011 for a short visit, and subsequently for a year-long mission beginning in January 2012. When Libya was liberated in October 2011, bombings by the international community and local militias left some areas more impacted than others. Gaddafi was from Sirte, and similar to

[361]Presumably to include engineering training. (A. Walter Dorn, notes provided to author, 30 April 2016).

Saddam Hussein and other dictators, his home town was beautifully planned and was the "centre of the universe" for the nation. During the war, Sirte suffered the most devastating destruction of all Libyan cities, with approximately 60 percent of its infrastructure destroyed. When Ms. Demirjian visited the city, the mayor stated to her that while he recognized the glory days of Sirte were over, he hoped it would not be forgotten during reconstruction efforts across the country.

At a later date, upon Ms. Demirjian's return to the city, engineers from the local authority had completed a rudimentary assessment of critical city infrastructure in an effort to generate a funding plan for reconstruction. Despite the sincerity of their efforts, international expertise was needed to create a professional prioritization and costing plan. However, the UN did not possess the expertise to take the plan to this next level. One of the principal reasons why ISIS gained a foothold in Sirte is that within the first year following ceasefire nothing was done with the infrastructure reconstruction plans, creating a power vacuum. With the support of the UN Mission in Libya, a national election was held in 2012 and discussions amongst Libyans commenced for drafting a national constitution. The Americans, along with the UN, had experts on the ground to help build the capacity of national institutions. While these "soft" issues received attention, the international community members were not paying attention to the power vacuum that had been generated, thinking of Libya as a rich country with seven million people could bring in the best firms to reconstruct the nation themselves. Unfortunately, with poor governance, weak leadership, and internal divisions, this did not occur. The rise of extremism and ISIS filled the local power vacuum and took over the town.

On the other hand, the Libyan city of Misrata had a very pro-business approach to reconstruction and believed they did not require the assistance from the international community.

However, they did not have the ability to bring the private and public sector together to create a viable reconstruction plan. Had international engineering support been available early on for Sirte, Misrata and other cities and towns, they would have bridged those engineering assessment and costing capability gaps. There was so much *bonne volonté* amongst the US, EU, and other international community members that the funding to complete the reconstruction would certainly have been made available. An opportunity for the international community's presence and efforts was gravely missed in Sirte, Misrata and other cities and towns. In addition, in the absence of "neutral" nations such as Canada – and perhaps the Scandinavian countries – the extremists took over. After the Libyan national election when the moderates prevailed, the absence of countries such as Canada to assist the new government in organizing themselves, and in the crucial matter of stabilization and reconstruction of destroyed cities, such as Sirte, Misrata, and Benghazi, are some examples of dismal failures on the part of the international community.

Haiti

In the case of the earthquake in Haiti, the ensuing humanitarian crisis was beyond tragic. When Ms. Demirjian arrived, some ten days after the earthquake, her role was to lead the World Bank and UNDP consultation to complete the costing plan for rebuilding national institutions and address its human resource components. The task was successfully completed within a month. The biggest issue to be addressed was the management of debris and destruction. Approximately 80-90 percent of houses in Port-au-Prince were destroyed. In UNDP Haiti, there were no experts in debris management. A UNDP engineer, who had been involved in debris management after the recent Palestine-Israeli conflict, was brought in from Gaza. The expert took stock of the amount of debris and of the equipment available. He then assessed how to dispose of the debris, which included segregating concrete from rebar and recycling both

components. Introducing this solution in Haiti not only reduced the amount of land required to dispose of debris, but also created jobs and reduced the amount of materials needed to be brought into the country for the reconstruction. Due to the enormity of the job, neither UNDP nor the international community was able to quickly develop and implement a debris management programme. These types of engineering solutions are invaluable during disaster management. Additional engineering skills needed in Haiti were infrastructure assessment and coordination of the public and private sectors for the reconstruction. While Haiti was swarmed with NGOs, the majority of these organizations provided the needed humanitarian relief, but they did not possess engineering expertise.

The Role for Canada in Meeting Future Needs

Should Canada decide to work in Iraq and Syria, similar assessment of infrastructure, debris management, and coordination of public and private sectors will eventually be needed for cities such as Ramadi and Mosul or in the case of Hama, Homs, Raqqa, and elsewhere, once stabilized. This is particularly true for cities in Iraq's Anbar Province, where devastation is so great that international engineering expertise will eventually be critical. While the international community failed in this regard in Libya, nations such as Canada can be prepared to meet these engineering challenges early after liberation, and foster stabilization within Iraq and Syria. With the scope and scale of infrastructure assessments that will be needed in Iraq and Syria, it will be necessary to leverage private as well as military engineering expertise. Canada can also help with providing the governance experts to assist with building the capacity of national and sub-national authorities, and helping local officials in business planning and delivery of basic services.

APPENDIX 6: THE UN EMERGENCY FORCE AND ITS INDISPENSBLE ENGINEERS

Engineers have played a critical role in UN peace operations since the first peacekeeping force deployed in 1956, which was a "new and stronger type of UN mission" than the UN had deployed until that time.[362] This mission also demonstrated numerous characteristics that would *often* become hallmarks of subsequent UN peace operations: the relative ease of finding infantry and other manoeuvre forces in comparison with what the UN terms "enabler troops", the essential collaboration between military, civilian, and commercial engineering personnel to accomplish mission requirements, and the ever-present danger of landmines and unexploded ordinance (UXOs).

The Suez War was the result of Israeli, French, and British forces hostilities with Egypt in late October 1956 following the latter's nationalization of the Suez Canal three months earlier.[363] Canada's Minister of External Affairs, Lester B. Pearson would win the 1957 Nobel Peace Prize for his innovative solution: to deploy an interposed multinational force under UN command, the UN Emergency Force (UNEF), between the Egyptian and Anglo-French troops in the area of the Suez Canal.[364] On 4 November, the UN General Assembly passed the resolution for Pearson's plan, and a former Royal Canadian Engineer (RCE), Major-General (later Lieutenant-General) E.L.M. Burns, was soon appointed as its commander[365] and would remain so until 1959.[366] Burns, a decorated World War II commander, was serving in October 1956 as the chief of the United Nations Truce Supervision Organization, an observer mission

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[362]Dorn, *Keeping Watch*..., 82.

[363]Roy Fullick and Geoffrey Powell, *Suez: The Double War* (London: Hamish Hamilton Limited, 1979), 10-11. Following the withdraw of financial support for the High Dam at Aswan by the Americans and British, Egyptian President Nasser required the approximate annual revenue of £35,000,000 from operating the canal to pay for the dam project. The dam was required to produce vast amounts of electrical power and ensure national water security.

[364]Lieutenant-Colonel K.J. Holmes (Retired), *The History of the Canadian Military Engineers: Volume III, to* 1971 (Toronto: Thorn Press Limited, 1997), 284; Norman Hillmer and J.L. Granatstein, *Empire to Umpire: Canada and the World into the 21st Century*, 2nd ed. (Toronto: Nelson, 2008), 203.

[365]United Nations, "Middle East – UNEF I: Background," accessed 5 March 2016, http://www.un.org/en/peacekeeping/missions/past/unef1backgr2.html; Holmes, *The History of the Canadian Military Engineers*..., 284.

[366]Fred Gaffen, *In the Eye of the Storm: A History of Canadian Peacekeeping* (Deneau & Wayne Publishers Limited, 1987), 49.

headquartered in Jerusalem.[367] In preparation for the arriving UN force in December, British engineers – a part of the invading force – built stores and ammunition dumps with perimeter protection, a prisoner of war cage, cleared rubble, and shored up damaged buildings. A shop was also established for production of camp structures to house departing troops and was also tasked with manufacturing coffins.[368]

The politics of the war resulted in an exclusion of the permanent members of the UNSC from providing troops to the UN mission, and consequently, nations such as Canada were amongst the few TCC-eligible nations with a well-trained and professional force that could provide critical enabler troops.[369] The initial Canadian contingent not only contained engineers, but also medical, communications, and logistical personnel that were critical to UNEF's ability to function.[370] Canadian military engineers were provided to UNEF throughout the mission – which lasted until 1967 – with the first rotation being composed of an approximately 60-person RCE detachment being initially sent from Canada, composed of combat engineers, construction engineers, and a 2-person surveying detachment to be seconded to UNEF headquarters.[371] Yugoslavia also initially provided military engineers to the mission for a period. Engineers were amongst the first forces into the theatre, with the Canadian engineers arriving before the end of November. Combat engineers were immediately employed with removing landmines laid by the belligerent forces or otherwise previously laid. As Burns later reflected:

> I pointed out that the engineer detachments which Yugoslavia and Canada were sending should be equipped with a good scale of mine-detecting and clearing

[367] Michael K. Carroll, *Pearson's Peacekeepers: Canada and the United Nations Emergency Force, 1956-67*, (Vancouver: UBC Press, 2009), 34.

[368] Colonel I.T.C. Wilson, Colonel H.W.B. Mackintosh, Brigadier R.A. Bloomfield, Colonel E.E. Peel, Brigadier J.B. Wilks, and Colonel G.W.A. Napier, eds. *History of the Corps of Royal Engineers, Volume X: 1945-1960, The Years of Colonial Insurgency* (Chatham: The Institution of Royal Engineers, 1986), 101.

[369] Carroll, *Pearson's Peacekeepers*…, 42-43; Hillmer and Granatstein, *Empire to Umpire*..., 202.

[370] Gaffen, *In the Eye of the Storm*, 43, 45.

[371] Holmes, *The History of the Canadian Military Engineers*..., 285.

> equipment. I knew that many minefields existed in the Sinai and Gaza Strip, and that they would give us a good deal of trouble. This turned out to be the case, and mine explosions caused more casualties and hazard to the force than anything else.[372]

Throughout the mission, engineers also busied themselves with numerous important general support tasks. Following the Israeli withdrawal from the Gaza Strip in early March 1957, people in the street during local celebrations made vehicle movements difficult for Canadian engineers tasked with establishing water production and conducting electrical repairs for the incoming UNEF force components. Accommodations were an issue that received constant attention, with engineers likely spending more time on this task than any other throughout the mission.[373] By 1960, many concrete accommodations huts had been erected and one camp had even had masonry facilities.[374] Water supply was a crucial resource in the desert climate. Engineers built water towers for each individual unit, and a few Canadian engineers operated a desalination plant in Sharm el-Sheikh.[375] Water supply in this terrain also presented challenges. In 1960, the Yugoslavian engineers took 10 days of drilling for a particular well that provided highly favourable initial water volume and quality reports. However, salt concentration gradually increased and rendered the well unusable.[376] Providing water to the Bedouin became a part of UNEF's humanitarian outreach. In the Canadian recce squadron's location, several watering holes were established and by 1960, 1,500 litres were being distributed per day.[377] Together with humanitarian medical services, the water distribution efforts created significant goodwill toward

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[372]Lieutenant-General E.L.M. Burns, *Between Arab and Israeli* (Toronto: Clarke, Irwin & Company Limited, 1962), 213.

[373]Bill Rawling, *Technicians of Battle: Canadian Field Engineering from Pre-Confederation to the Post-Cold War Period* (Toronto: Military Engineering Institute of Canada and The Canadian Institute of Strategic Studies, 2001), 291.

[374]Rawling, *Technicians of Battle*..., 292.

[375]Carroll, *Pearson's Peacekeepers*…, 153.

[376]Rawling, *Technicians of Battle*..., 291.

[377]Carroll, *Pearson's Peacekeepers*…, 146.

the mission from the Bedouin.[378] It also served to reduce the frequency of theft and border crossings when it became understood that these resources could be withdrawn by the mission.[379] As examples of the very good relations with the Bedouin, a Bedouin gave shelter and medical treatment to a Canadian soldier injured by a mine blast until assistance arrived, and in another guarded the body of a deceased soldier to protect it from animal scavengers. Bedouin also became known for standing on the sides of routes frequently used by UNEF to warn soldiers of freshly placed or uncovered mines.[380] Nevertheless, the threat of mines did remain an ever-present threat throughout the mission.[381]

Other Canadian engineering tasks included restoring and maintaining several camps inhabited by the mission contingent (that averaged 4,700 troops and was at a height of nearly 6,000 in 1957)[382], and constructing runways at both El Arish and Sharm el-Sheik.[383] Four Canadians had the opportunity to demonstrate engineer versatility when their "experience in railway and diesel engine operation and maintenance" allowed them to operate a humanitarian railway for the Red Crescent for the distribution of food and fuel oil provisions. Road repairs throughout Sinai were also completed by Canadian engineers, as were roads and facility improvements within the various UNEF camps. Later in the mission, some nations chose to deploy small detachments of engineers, but only for their own local improvements.[384]

Military engineering resources deployed on UNEF were insufficient for all the tasks required of them. For example, a large number of local Egyptians were directed by military engineers during the completion of a rail rehabilitation project at El Arish and numerous road

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[378]Gaffen, *In the Eye of the Storm…,* 57.
[379]Carroll, *Pearson's Peacekeepers*…, 147.
[380]Carroll, *Pearson's Peacekeepers*…, 147.
[381]Gaffen, *In the Eye of the Storm*…, 57.
[382]Gaffen, *In the Eye of the Storm…,* 41, 47.
[383]Holmes, *The History of the Canadian Military Engineers*..., 285.
[384]Holmes, *The History of the Canadian Military Engineers*..., 285-286.

projects.[385] Also, during the war, some 49 ships and barges as well as two bridges had been destroyed and obstructed traffic from transiting the canal,[386]and in turn created a matter "of a most urgent character" concerning world trade.[387] This clearance operation was not considered a military task.[388] Both the Egyptian government and the UN Secretary-General, Dag Hammarskjöld, discussed the matter directly on 16 November 1956. The UN accepted the task and Hammarskjöld personally appointed retired US Lieutenant-General Raymond Wheeler to head the task on behalf of the UN. He had previously managed salvage operations after the Normandy invasion in 1944.[389] Despite the British assertion that they alone possessed the expertise to clear the canal, Wheeler engaged a salvage fleet from European nations that were non-participants in the Suez War (Belgium, Denmark, Germany, Italy, The Netherlands, Sweden, and Yugoslavia).[390] Operations commenced on 28 December,[391] and by 29 March 1957, the first ships were transiting through the canal. Upon completion of normal canal trafficking capability, Wheeler had succeeded in outperforming the official British estimates by two months and $31.5 million.[392]

APPENDIX 6: CANADIAN LEADERSHIP FOR ESTABLISHING A UN EMERGENCY PEACE SERVICE?

In the latter 1990s, Canada was a leading nation in establishing the UN Stand-by Forces High Readiness Brigade (SHIRBRIG) (see page XXXX) to increase readiness and response

[385]Burns, *Between Arab and Israeli*…, 243.
[386]Carroll, *Pearson's Peacekeepers*…, 45.
[387]Dag Hammarskjöld, "Report to the General Assembly on the Clearing of the Suez Canal," in *Public Papers of the Secretaries-General of the United Nations: Volume III, Dag Hammarskjold, 1956-1957*, ed. Andrew W. Cordier and Wilder Foote (New York: Columbia University Press, 1973), 383.
[388]United Nations, "Second Report to the General Assembly on the Clearing of the Suez Canal," in *Public Papers of the Secretaries-General of the United Nations: Volume III, Dag Hammarskjold, 1956-1957*, ed. Andrew W. Cordier and Wilder Foote (New York: Columbia University Press, 1973), 453.
[389]United Nations, "Second Report to the General Assembly..., 455; Carroll, *Pearson's Peacekeepers*…, 45.
[390]Carroll, *Pearson's Peacekeepers*…, 45; United Nations, "Second Report to the General Assembly..., 458.
[391]United Nations, "Second Report to the General Assembly..., 456.
[392]Carroll, *Pearson's Peacekeepers*…, 45.

times for conducting urgent peace operations.[393] Becoming operational in 2000, the SHIRBRIG participated in a number of operations before its unjustified dissolution in 2008. A subsequent iteration of this concept, a UN Emergency Peace Service (UNEPS), is currently being advocated to meet ever-increasing need for timely UN peace operations deployment. Just as it did in the 1990s for SHIRBRIG, Canada has an opportunity to advance the creation of the UNEPS as a critically needed UN capability – of which engineers will be a key component for mission start-up.

Essentially a "first responder for complex emergencies," the UNEPS would be tailored to meet UN peace operations demands for rapid deployment, protection of non-combatants, prevention of armed conflict and mass atrocities, and addressing human suffering where assistance from others is either unavailable or withheld.[394] It would complement, not supplant existing UN response capabilities[395] such as the newly created Peacekeeping Capability Readiness System (PCRS; successor to the UN Stand-by Arrangements System) under the recently established Strategic Force Generation and Capabilities Planning Cell. The UNEPS would provide a maximum six-month "first-in, first-out" service for any individual mission, and would be replaced by UN personnel drawn from member states as per existing arrangements.[396] A multidimensional force, being composed of approximately 15,000 military, police, and civilian

[393]Lieutenant-General (Retired) Roméo Dallaire, former Force Commander for UNAMIR, stated that had his own force been augmented by such a capability, he could have stopped the Rwandan genocide. See: Michael E. O'Hanlon, *Expanding Global Military Capacity for Humanitarian Intervention* (Washington, DC: Brookings Institute Press, 2003), 8.

[394] Dr. Peter H. Langille, *Time For a United Nations Emergency Peace Service* (Ottawa: World Federalist Movement – Canada, 2015), 2.

[395]Langille, *Developing a United Nations Emergency*..., 47; Saul Mendlovitz, Edward Westfall, and Stephen Bishop, "Draft Statute for the Formation and Operation of the United Nations Emergency Peace Service for the Prevention of Genocide and Crimes against Humanity" (draft statute, Rutgers-Newark School of Law, 2013), i.

[396]Mendlovitz, Westfall, and Bishop, "Draft Statute for the Formation..., i.

personnel,[397] UNEPS would have the capability to deploy lead elements within days of receiving a UNSC mandate, with light elements being deployed within a week, and heavier elements within weeks.[398] Importantly, UNEPS personnel would be composed of volunteers recruited and employed directly by the UN and who would subsequently receive rigorous training.[399] The Canadian Government has previously stated that "a UN rapid reaction capability can be truly reliable only if it no longer depends on the Member States of the UN for supply or personnel for peace operations."[400]

A UNEPS would have organic specialized capabilities, such as engineering, aviation, and medical, which "remain critical chokepoints"[401] within the existing UNSAS-reliant regime. Furthermore, despite high start-up costs, a UNEPS has been argued to provide a measure of long-term operational cost savings by deterring future conflicts and eliminating the inflated UN peace operations costs resulting from existing delays to deployments under the UNSAS regime,[402] although some might consider this point debatable.

Through a newly reinvigorated role in UN peace operations, Canada will increase its credibility within the international organization and possess greater influence with Member Nations for advancing the UNEPS concept. Canada could consider first approaching Denmark and The Netherlands, who together had initiated efforts that ultimately established the SHIRBRIG. The like-minded middle-power Nordic nations are also good candidates for potentially collaborating with on this initiative. A strong consortium of countries will likely be

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[397]Langille (2016, p. 46; 2015, p. 10) proposes a UNEPS force of approximately 13,500 personnel. Mendlovitz, Westfall, and Bishop (2013, p. ii) propose a UNEPS force between 16,000-18,000 personnel, although the proposed tasks of this force are "prevent and/or halt the commission of Genocide and Crimes against Humanity and where possible apprehend individuals known to have engaged in such acts."

[398]Langille, *Time For a United Nations Emergency*…, 8.

[399]Langille, *Preparing For A UN Emergency*..., 5.

[400]Government of Canada, *Towards a Rapid Reaction Capability for the United Nations* (Ottawa: Government of Canada, September, 1995), 60.

[401]Hervé Ladsous (speech, Brookings Institution, Washington, DC, United States, 17 June 2014).

[402]Langille, *Time for a United Nations Emergency*…, 11-12; Langille, *Preparing For A UN Emergency*..., 5-6.

required to lift the idea of establishing a UNEPS beyond the concept phase, particularly for countering objections to the high start-up costs associated with initial training, equipment, and infrastructure for the force, as well as establishing long-term financial commitments for wages and training, equipment and infrastructure maintenance costs, and other ongoing costs.