The Uses and Limitations of Technology in Civil-Military Interactions

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ABSTRACT

United States and allied military forces are currently conducting Peace Operations around the world and it appears that this trend will continue. Peace Operations require different techniques and principles that warfighting and also involve considerably more interaction with civilian governments, agencies and populations. When the command and control principles for Peace Operations are analyzed with an eye to where technology can best assist a military commander in charge of peacekeeping forces, three areas stand out: Security and Force Protection, Situational Awareness, and Communications. The authors' discuss some of the merits and limitations of relevant technologies that can support the three areas and provide suggested priorities for development and use.

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INTRODUCTION

In the wake of the Cold War, US and allied armed forces are being increasingly called upon to conduct non-traditional missions that include peacekeeping and humanitarian assistance and disaster relief (HADR). During these missions military forces interact with the local population and the component local and national governmental authorities (or de facto leaders). At the same time the forces interface with and support numerous other entities including other US and foreign governmental agencies, world organizations (e.g., United Nations), international organizations (e.g., Red Cross or the Pan-American Health Organization), and non-governmental and private voluntary organizations (NGO/PVO).[1] Military forces are often ill equipped or trained to smoothly interact with local populations and Civilian Participants. Indeed, most military personnel are trained and equipped to either fight in combat or to support combat operations. While military forces are usually not the primary actors in these non-traditional operations, their presence is usually the essential ingredient needed to enable the Civilian Participants to achieve success. Military forces can expect to be called on to provide security, logistics, lift, and command and control in support of the Civilian Participants in peacekeeping and disaster relief operations.[2]

This paper is written from the perspective of a military commander involved in a Peace Operation. The paper discusses how technology can help achieve success in Peace Operations and also discusses its limitations in the same environment. The paper begins with an analysis of the "Principles of Peace Operations" as discussed in *Command Arrangements for Peace Operations*.[3] This analysis provides insights into the kinds of requirements that might be met by technological solutions. Relevant technologies currently available are discussed along with analysis of their merits and limitations. Finally, based on these discussions and analyses, the authors present a prioritized list of the most needed technical aids for Peace Operations.

THE PRINCIPLES OF PEACE OPERATIONS

In *Command Arrangements for Peace Operations,* Alberts and Hayes assert that Peace Operations often force commanders to violate the principles of war, and that these principles need either to be abandoned or modified. They list alternative principles for Peace Operations (the only classical Principle of War that appears in this list is "Simplicity.") It is around these principles that the authors frame their analyses for the paper. The principles for Peace Operations as defined by Alberts and Hayes are:

- Unity of Purpose (as opposed to Unity of Command).

- Consensus Planning (not hierarchical decision making).

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[1] These entities are hereinafter referred to as "Civilian Participants."
[2] Hereinafter referred to as "Peace Operations."
[3] Alberts, David S. and Richard E. Hayes, 1995.*Command Arrangements for Peace Operations*, Washington DC: National Defense University Press, May.

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- Simplicity (particularly where multinational and multi-agency operations are involved).

- Adaptive Control (rather than initiative).

- Transparency of Operations (rather than surprise and secrecy).[4]

The first three principles are closely interrelated and interdependent. Unity of Purpose is created and maintained by Consensus Planning and Simplicity. Consensus Planning supports Unity of Purpose by permitting the interaction necessary to both hear the range of national and other agenda relevant to the operation and to build confidence within and among the various entities involved. Simplicity is essential to ensure that consensus can be built and to make it easier to maintain the clear objectives and procedures to support the Unity of Purpose.

Nevertheless, unity of purpose is nearly impossible to achieve in situations where there is an admixture of coalition military forces, government agencies, NGOs and PVOs. Indeed, many PVOs mistrust the military and want as little to do with them as possible. Some of the actors involved may well have different or opposed agendas than the government(s) or the military forces involved. The goal is that some form of Unity of Purpose can be attained.

Adaptive Control is necessary because Peace Operations are essentially reactive and passive in nature. It refers to comprehending the situation well enough to understand the operation's range of evolving futures, recognizing which of these futures is emerging, and taking timely action to influence the course of events so that the right outcome is achieved.

Transparency of Operations is essential so that the various entities involved in the operation (or present in the theater of operation) are not surprised, and to limit opportunities for misunderstanding. For example, regular scheduled military patrols may not be as likely to catch mischief-makers red-handed, but they will establish a sense of normalcy. Likewise, supply convoys and evacuations announced in advance eliminate uncertainty about cargoes, purposes, and movements.[5]

ANALYSIS

An analysis of the Principles of Peace Operations that would benefit from technology interfaces or advances follows:

1. *Unity of Purpose* requires capabilities that facilitate communications across language and cultural barriers. Technologies that can support better communications include language translators and local networks that link the military and Civilian Participants. For example, specific websites for Peace Operations have the potential to become or evolve into virtual CMOCs or CIMICs. It is also necessary to have rapid, global connectivity for reach-back

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[4] *Ibid.*, pp. 129.
[5] *Ibid.*, pp. 27-37.

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capability to contact higher authorities (e.g., NGO/PVO headquarters) for clarification, guidance, and concurrence. Military satellite communications serve the US military but these may not be available to Civilian Participants due to security and cost reasons. Access to commercial systems such as the Iridium satellite telephone system or the INMARSAT satellite system can fill this void.

2. *Consensus Planning* requires access to planing modules and tools and to information. Some sensitive information is often not accessible to non-US, non-military parties because of security restrictions that are designed to protect sensitive sources or methods. Regardless, methods of disguising sources or deleting non-essential but sensitive materials are available and should be used to disseminate plans and other information such as the location of minefields, availability of air and surface lift, and the schedules and routes of planned military patrols. A well functioning Civil-Military Operations Center (CMOC-as discussed later) can greatly facilitate both planning and dissemination.

3. *Simplicity* is essential for many reasons that include considerations about the limitations of coalition/NGO/PVO equipment, training, and experience. Simple solutions and procedures facilitating a successful integration of Civilian Participants and military forces during a Peace Operation may also be inhibited by budget limitations, language differences, and the technical sophistication of the actors involved.

4. *Adaptive Control* depends on good situational awareness and local intelligence to be effective. There is often a need to respond quickly to events and situations that, if left unchecked, could derail the military's mission (e.g., media misinformation problem). For example, the commander of UN peacekeeping forces in Mozambique related that belligerents and others opposed to the UN presence were able to use local radio stations to spread propaganda against the UN's presence and operations. The commander found it necessary to conduct outreach programs, including purchasing local radio time, setting up his own transmitters, and conducting local medical and civil engineering projects to create positive images.[6]

5. *Transparency of Operations* requires ways to disseminate/distribute information quickly and unambiguously to all concerned. At the same time there is a need to balance force protection with openness. Again, creative use of a CMOC can promulgate information about patrols, lift opportunities, schedules and the like.

Analysis of the capabilities discussed above yields an obvious need for technologies that support *communications* and *situational awareness*. Perhaps not as obvious but absolutely essential to success of any operation is the *security* umbrella that enables the operation to

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[6] *Command and Control in Peace Operations: Workshop 3 Report: Western Hemisphere Experience in Global Peace Operations.* Washington DC: National Defense University Press, May 1995, p. 23.

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progress in a safe manner and protects the forces involved as well as the Civilian Participants.

CANDIDATE TECHNOLOGIES

SECURITY AND FORCE PROTECTION

We discuss Security and Force Protection first because Peace Operations can't succeed without a strong security structure. If warring factions cannot be kept apart or under control, then the peacekeepers, local population, and other Civilian Participants are all at risk. The peacekeeping forces must be credible and visible. Protection of peacekeeping forces (Force Protection) is usually a Peace Operation's first objective. Without good force protection, the mission can't succeed and most other players and entities in support of the operation also become at risk. US military forces learned this lesson the hard way in Lebanon in 1983, and again in Somalia in 1992 and 1993.

ENCLAVE SECURITY

Good enclave security relies upon secure perimeters. Low-tech solutions date from the Roman Army and include stockades, sentries, and patrols. Current technologies useful for enclave security include sensors and night vision devices in addition to physical barriers. For example, the US Army has developed a new system, presently used in Bosnia, and called REMBASS (Remotely Monitored Battle Field Sensor System). This integrated system consists of seismic acoustic sensors, magnetic sensors and infrared passive sensors, all strategically placed outside the perimeter. The system is sensitive to vibrations in the ground. A monitor at the base camp beeps a warning when movement or vibrations are detected near the perimeter. The sensors are implanted into the ground in holes 6-10 inches deep in inconspicuous locations and detect anything from personnel to vehicles. It is possible for dog walking by or even helicopter vibrations to set the system off. Maximum vehicle detection range is about 350 meters.[7]

Detection is only half the answer. It is also necessary to determine if the intrusion is benign or hostile. For instance, if military personnel can be electronically "tagged", why cannot the same be done with civilians? A system to identify "friend or foe", currently being refined by US military forces to eliminate fratricide on the battlefield, could be developed and cross-applied to civilians of a host-nation during a Peace Operation. This system would be especially useful to US military forces during Military Operations in Urban Terrain (MOUT). A meal card or identity "card" could be embedded with a chip that might be scanned from afar as "friendly" (since the civilian is carrying it). Similarly, if a civilian is scanned and found not to be carrying an embedded card then there is higher probability that the "civilian" might be "foe." This friend or foe embedded card system might also aid military forces at checkpoints and in (MOUT). Some recent MOUTs, e.g., Somalia and in

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[7] Staff Sargent Vonny Roholff, *Army News Link*, May 1977.

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Haiti (specifically in Port-au-Prince) are operations, where this technology might have been of beneficial use (e.g., saving civilian lives).

COUNTER-SNIPER

A single sniper can have a debilitating and disproportionate effect on any Peace Operation, particularly in densely populated urban areas. Snipers need to be swiftly neutralized. Various acoustic and infra-red (IR) systems are under development. One such system is the Livermore Labs "Lifeguard" anti-sniper system that uses IR sensors to track the heat of a bullet back to its point of origin. The system can be coupled with an automatic response that either shoots back along the bullet track to the point of origin, or illuminates the sniper.[8]

LANDMINES

In its latest report on landmines the US Department of State estimates that there are about 60 million antipersonnel landmines scattered regionally in 60 countries. Half the total is concentrated in 12 mine-infested countries.[9] These "Hidden Killers" not only take a severe toll in human suffering; they also render huge areas of otherwise productive land unusable by their presence. It costs between $300-1,000 to remove one mine and this is a particularly onerous price for poor agrarian societies. The presence of landmines also threatens peacekeeping and post-conflict recovery and reconstruction. Landmines may also impede humanitarian assistance efforts, prevent the delivery of urgently needed services and supplies, and discourage potential foreign investment.[10] Hence, landmines are a threat to everyone during a Peace Operation, be they peacekeepers, relief workers, or the indigenous population.

While it is unlikely that any "silver bullet" demining technology or tool will ever be found to make demining quick, safe and easy, there is promise for vast improvements in detection, clearance, and neutralization tools. Detecting mines is the major problem in mine clearance. Modern antipersonnel mines are inexpensive, small and made of various substances (including plastics), thereby making it nearly impossible for a common metal detector to distinguish landmines made from other materials. Some of the more promising mine detection technologies include ground-penetrating radar, infrared (IR) detection, ultrasound acoustic sensors, nuclear radiation applications (to detect explosive substances in the mines) and even bacteriological microorganisms.

Once the mines are detected, they must be cleared or neutralized. Clearing by humans is slow and risky. Hence, current research efforts are concentrated on non-human technologies and techniques. These non-human technologies consist mostly of mechanical devices such as rollers, flails, and robotic "mine-proof" vehicles. Neutralization techniques also include foams that explode or mark/neutralize, and certain kinds of chemical neutralization.

[8] Hayes, Richard E. and Gary Wheatley, *Operations Other Than War: The Technological Dimen*sion. Washington DC: National Defense University Press, November, 1995, p. 47.
[9] *Hidden Killers 1998: The Global Landmine Crisis.* Washington DC: Department of State Publication, Bureau of Political-Military Affairs.
[10] *Ibid.,* Preface and Executive Summary pp. 1-6.

Technology is making significant strides in demining efforts, but it is not a panacea. While the current technological solutions may be effective, they are far too limited to fully address the enormous number of "Hidden Killers" buried world wide.[11]

NON-LETHAL WEAPONS

In many Peace Operations, military forces are faced with situations where there is a need for weapons that could effectively fill the gap between verbal warning and deadly force. There is also a requirement for non-lethal technologies that can create time and space. Peacekeepers need time to keep situations from escalation and to allow development of alternative courses of action. Space is a visible or invisible barrier that separates antagonists or protects one's own forces. For example, a system that can stop a vehicle could provide both time and space: time to inspect for explosives and space between the vehicle and potential targets until the inspection is completed. Another requirement is for non-lethal technologies that control or help control levels of violence. These compliment the "create time and space" requirements. Included are methods for individual and crowd control, ways to separate belligerents from other belligerents and from non-combatants, and to monitor the separation.[12]

US Marines operating in Somalia in 1995 used a variety of non-lethal weapons ranging from sticky foam to pepper spray to wooden/rubber bullets and pellets. Results were mixed and use of these weapons was hampered by concerns about unintended consequences and complex/awkward rules of engagement (ROE).[13] A lesson re-learned from Somalia is that there are no guarantees that these weapons won't cause death or permanent injury. "Non-lethal" is a misnomer and attempts to reclassify these kinds of weapons as "less that lethal," "pre-lethal," and so on have not clarified the issue. Under the right (wrong) conditions, any of the current crop of so-called non-lethal weapons can cause death, or permanent injury.[14]

There are nevertheless many situations where non-lethal weapons could be of great value in Peace Operations. These include crowd control, dispersion of rioters, passively stopping or disabling vehicles (recall the truck bombing of the US Marine Corps barracks in Lebanon in 1983), hostage rescue and so on. The uses of non-lethal weapons are currently limited by ROE and present technology. One can hypothesize that other non-lethal weapons will be developed in the near future. Anything that can help fill the gap between inaction and the use of deadly force can enhance peacekeeping success.

SITUATIONAL AWARENESS

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[11] *Ibid*. Chapter IV, pp. 1-7.

[12] Hayes, Richard E. and Gary Wheatley, 1995. *Operations Other Than War: The Technological Dimension*, Washington DC: National Defense University Press, November, pp. 25-26.

[13] Lewer, Nick and Steven Schofield, 1997. *Non-Lethal Weapons: A Fatal Attraction? Military Strategies and Technologies for 21st Century Conflict*. London and New Jersey: Zed Books, pp. 68-74.

[14] Hayes, Richard E. and Gary Wheatley Eds., *Operations Other Than War: The Technological Dimension*, Washington DC: National Defense University Press, November 1995, p. 46.

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Good situational awareness contributes to every facet of Peace Operations, whether it is planning or Force Protection. Situational awareness is built upon good intelligence, mobility and displays. While the US armed forces do well in the latter two areas, they are deficient in human intelligence gathering and interpretation, particularly in the cultural context. This is because it takes years to learn and understand a different culture, and even longer to develop the skills to acquire human intelligence on a particular culture. A military force can hire local agents of course, but their loyalty and veracity is often unpredictable. Without an understanding of the cultural dimensions in Peace Operations, otherwise correct assumptions and interpretations can lead to fatal results. In Somalia for example, the US military was ignorant of the cultural interdependency of the Somali clan and its male warrior ethic. US military forces did not grasp the fact that the campaign to capture the Somali War Lord Muhammad Aidid would impact their operations in a negative way. The fight against Aidid became a fight against Aidid's entire clan.[15] It is in this cultural area that much needs to be accomplished, and in the authors' view, this is an area where technology offers only limited help.

Situational awareness can also be improved by technologically enhanced reconnaissance and surveillance, and by better displays. Imagery from satellites to Remotely Piloted Vehicles (RPV) and Unmanned Aerial Vehicles (UAV) should be made available to the tactical commander of a Peace Operation. Also needed are technologies that will fuse imagery with data from all other sources such as the Global Positioning System (GPS) and Global Information System(s). The fused information needs to be displayed in ways that show what is known and also what is not known. The displays also need to be portable and survivable in the field. This need was revealed in the death of eighteen American soldiers in a one-day chaotic battle in Somalia in 1993. This was because the soldiers did not know where they were in downtown Mogadishu as they tried to conduct a mission. It is ironic that that a country that can put a remotely operated vehicle on Mars could not navigate 5 blocks in Mogadishu.[16] Precise navigation coupled with map displays and overlays can avert this kind of problem in the future.

COMMUNICATIONS

COMMUNICATION/COORDINATION CENTERS

Good communications are an integral part of Peace Operations. This includes US military forces communicating with other US government agencies, local populations, multi-national forces, and other Civilian Participants. Whenever possible, communication should start with the planning of a Peace Operation. Presently, that is not always the case. Indeed, earlier research has shown that for a variety of reasons, US military and US interagency coordinated planning efforts are severely deficient. Analysis of the 1994 US intervention in Haiti identified several systemic interagency planning problems and developed several important

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[15] Allard. Kenneth, 1995. *Somalia Lessons Learned*. Washington DC: National Defense University Press.
[16] Bowden, Mark, 1999. *Black Hawk Down*, New York, New York: Atlantic Monthly Press.

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lessons learned, in particular the need for pre-planning and coordination.[17]   One proposed solution to these problems is the establishment of an Interagency Operations Centers (IOC) located at the geographic CINC's headquarters and staffed with high quality people from the State Department and other relevant agencies.[18]   Unfortunately, the current climate for staffing such organizations is poor, however this is one area where a technology solution could help.   That is, these IOC could function as distributed, virtual organizations that communicate and plan via commercially available place-ware such as Collaborative Virtual Workspace (CVW), video tele-conferencing (VTC) and Internet web-sites.

Once an operation begins the communication and planning must continue. The military and the Civilian Participants all must be able to both impart and receive information during a Peace Operation.   This can be greatly facilitated through use of communications in coordination centers such as the Civil Military Operations Center (CMOC, US), the Humanitarian Operations Center (HOC, UN) or the Civil-Military Co-operation "center" (CIMIC, NATO). Sometimes a lower technology solution makes better sense. For example, discussions with several NGO/PVO organizations yielded the information that due to small budgets, they could not afford new computers or communications equipment. Some relied entirely on donated equipment. A project called CiMiLink[19] provided a set of low-end tools (e.g., 286 computer, 2400 baud modem) designed to support the exchange of information and the creation of common situation perception among the military and Civilian Representatives. Using COTS Bulletin Board System (BBS) technology, a DOS-based Electronic Bulletin Board was developed, accessible by telephone, radio and telnet, and of course, in the CMOC itself. The system enables e-mail, chat, database capabilities, Internet access, and provided information about security, logistics and other support information.

Whatever the vehicle, technology enabled systems in military-civilian operations centers are a key communications enabler.

MEDIA

Media coverage is a two-sided coin. On one side almost everyone and everything can expect to be in the media spotlight. On the other side media outlets, such as TV and radio, are valuable sources of information on the current situation, and can supplement intelligence sources. Military personnel, either in a CMOC or in a HQ, should have access to CNN (both domestic and International), BBC (both TV and radio) and local electronic media outlets. With access to these outlets, US military forces will have timely and relative accurate information concerning their immediate environment. Concurrently, these centers and HQs should have access to the Internet to compliment TV and radio. In fact, some documents and websites can be translated, though at present only in certain languages (mostly in the

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[17] Margaret Daly Hayes and Gary Wheatley (eds.), 1996. *Interagency and Political-Military Dimensions of Peace Operations: Haiti—A Case Study.* Washington DC: National Defense University Press, February, pp. 29-51.

[18] Gibbings, Thomas, Donald Hurley, and Scott Moore, 1998. Interagency Operations Centers: An Opportunity We Can't Ignore. *PARAMETERS*, US Army War College Quarterly—Winter, pp. 99-112.

[19] Evidence Based Research developed a prototype CiMiLink for DoD in 1997. It was subsequently tested with a UN World Food Program Project in Sierra Leone, and at the US Army standing CMOC at Fort Brag, North Carolina.

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Romance languages), by an Alta Vista website.[20] The translation is done by the computer application SYSTRAN. Further the Foreign Broadcast Information Service's website (http://199.221.15.211/) allows for almost real-time viewing of unclassified documents and media reports posted on the web.

Peacekeepers can also use radio and TV in a proactive fashion to get messages and information out to the local population and Civilian Participants. This effort could compliment and supplement CMOC information on topics ranging from landmine clearance to refugee resettlement efforts.

The media (both international and local media) can also help military forces define operational intent to the local population and host nation. For example, "During the UNPROFOR mission in Bosnia, many commanders used the local press to promote their activities and inform the locals about their operations. Several commanders recognized that the communist mentality still prevalent at the time helped them convey their message to the local populations." When US military Public Affairs officers sent press communiqués to a local news media outlets in Bosnia, the media outlets simply printed the communiqués verbatim since this was the inherited communist tradition. Hence, the US military's message and intent was communicated to the civilian population and host nation. This supported the civil-military interaction component of operations in Bosnia.[21]

In sum, a military force's picture of the situation and its interface with Civilian Participants during a Peace Operation can be made more clear with the innovative use of media outlets and Internet technologies.

PSYCHOLOGICAL OPERATIONS

Related to media is the importance of Psychological Operations during a Peace Operation. Psychological Operations help to get the military's message out to Civilian Participants by the use of both traditional and innovative technologies. For example, US Special Operations Forces have developed a deployable media center that provides enhanced tactical television and radio capabilities to produce, broadcast, record, and retransmit programming material. The "center" is mounted on highly mobile multipurpose-wheeled vehicles and is C-130 deployable with drive-on/drive-off capabilities.[22] US Special Operations Forces have also developed a family of loudspeakers in order to offer high-quality loudspeaker broadcast to target areas and audiences. The speakers can be mounted on track/wheeled vehicles, watercraft, and rotary-wing aircraft. They can be dismounted for ground operations onto to a tripod or stand. In another way to convey information, Special Operations Forces have developed a print production center. This center is a rapidly deployable, self-contained shelter mounted system for creating, editing, and producing print products in forward-deployed locations. It is mounted on a heavy-wheeled vehicle with a C-130 roll-on/roll-off capability. The center's features include advanced workstations with sophisticated capabilities for graphics, motion, still, video, color scanner, desktop publishing.

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[20] http://babelfish.altavista.com/cgi-bin/translate
[21] Combelles-Seigel, Pascale. *The Military and the Media in Peacekeeping Operations*, forthcoming.
[22] The contractor is the Naval Air Warfare Center, Aircraft Division, St. Inigoes, Maryland.

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Another psychological operation capability in support of US military forces during a Peace Operation is the leaflet delivery system. A bat-winged aerial vehicle can disperse large quantities of leaflets in denied areas at offsite ranges of up to 20 kilometers. The US military is also considering the development of a staged leaflet delivery system, a precision guided canister bomb, and a guided precision aerial light delivery system.[23]

TRANSLATION

Translation tools have great potential to support the US military during Peace Operations. One example is a Seiko developed translation device called The Quicktionary. It is a portable, handheld scanner enabling optical character recognition and translation of the Romance languages, Korean, Japanese, Russian, Chinese, and Hebrew. A "talking" version of the Quicktionary is also available in the Romance languages. The efficacy of this device in Peace Operations is that soldiers can interpret in real-time locally printed (or written) documents or pamphlets. This capability could aid in intelligence gathering, force protection and the recognition (or validation) of normalcy indicators. Another translation device is the US Army's FALCon (Forward Area Language Converter) translator. This is a testbed system developed by the Army Research Laboratory to translate Serbian or Croatian documents in Bosnia. Other language capabilities for FALCon have been (or are being) developed. The end goal concerning translation technologies is real-time on-site translation devices.[24]

TECHNOLOGY PRIORITIES AND LIMITS

Technology developments and research in other areas of Peace Operations hold great promise. However, new technologies cannot solve all problems concerning civil-military interaction during a Peace Operation. As alluded to previously, the biggest hurdle to a successful interaction between the local population, military forces, the host nation and Civilian Participants is the lack of communication and coordination. For example, most military forces and Civilian Participants do not share the same type of tactical radio. Accordingly, they cannot talk to each other on the ground. An example of a partial solution is when Norway, as a part of NATO's support to the OSCE mission to Kosovo in Autumn 1998, provided the team members with radios interoperable with NATO.

Research in technologies that identify who is a friend or foe should be explored with high priority.

Another research priority concerns instant translation. A technology that can translate in real-time what is being said in a foreign language by an armed civilian trying to pass through a military checkpoint would be quite worth the soldier's lives it might save. Concurrently, "instant" translators would also contribute to the human intelligence (HUMINT) and force protection components of a Peace Operation.

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[23] *National Defense*, February 1999, p. 22.
[24] Army Research Laboratory, 1997 *Annual Review*, 15.

Further research on the uses of the Internet to convey information and interconnect people and HQs is also needed. For instance, there is the potential that web-sites might become virtual CMOCs or CIMICs.

Non-lethal weapons and technologies that can buy time and space for peacekeepers have the potential to save lives and control dangerous situations. Technical research as well as studies on tactics and ROE should continue.

Counter-sniper systems should be available to all peacekeeping missions.

CONCLUSIONS

Technology can indeed assist the peacekeeper, particularly those technologies that facilitate communications, situational awareness, and security. But technology alone cannot substitute for proper preplanning and coordination. Neither can technology substitute for, or overcome failure to understand and utilize the cultural dimensions of each particular operation.

Technology is often expensive and constrained military budgets will not accommodate technologies that do not also have a combat application.[25] Further, sharing equipment with coalition partners and other participants in a Peace Operation may not be possible without supplemental funding and in some cases, amendments to US laws (e.g., US laws spell out the limitations and prohibitions concerning how US military equipment can be transferred to foreign nations).

Peace Operations can become open-ended. Peacekeeping operations on Cyprus and in Bosnia are examples of this reality. Technology cannot substitute for national will, commitment to a long term solution, and a clearly defined end state and exit strategy. But by improving situation awareness and monitoring, technology can help in achieving a better picture about when certain conditions have been met.

Finally, peacekeeping operations are about dealing with people. Technology alone will never be as effective as face-to-face communication that yields mutual understandings.

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[25] Hayes, Richard E. and Gary Wheatley (eds.), 1995. *Operations Other Than War: The Technological Dimension*. Washington DC: National Defense University Press, November, p. 56.